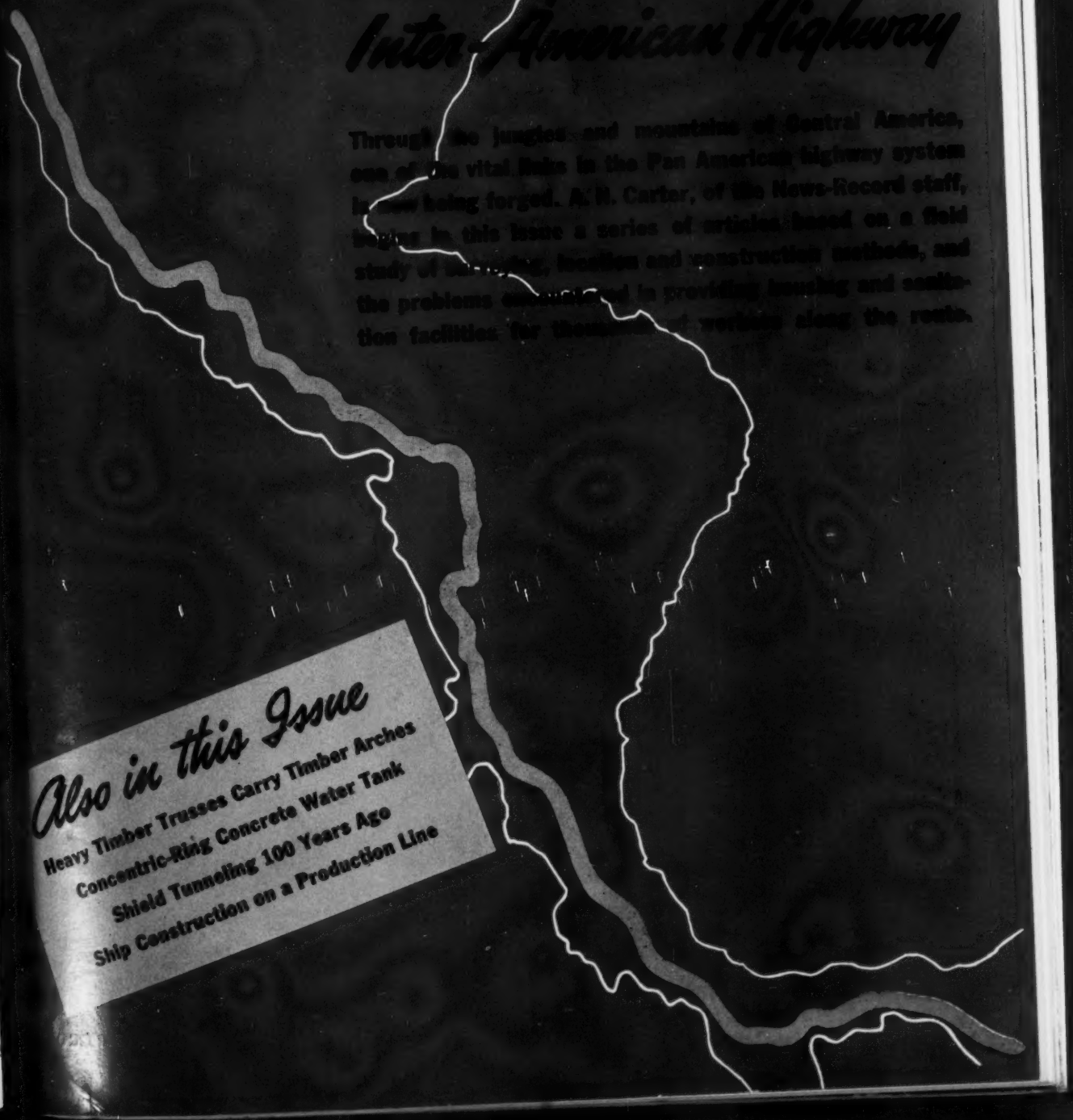
ENGINEERING NEWS-RECORD

JULY 29, 1943

Building the Inter-American Highway

Through the jungles and mountains of Central America, one of the vital links in the Pan American highway system is now being forged. A. B. Carter, of the News-Record staff, begins in this issue a series of articles based on a field study of surveying, location and construction methods, and the problems encountered in providing housing and sanitation facilities for thousands of workers along the route.



Also in this Issue

Heavy Timber Trusses Carry Timber Arches

Concentric-Ring Concrete Water Tank

Shield Tunneling 100 Years Ago

Ship Construction on a Production Line

are you planning now for BETTER POSTWAR HIGHWAYS?

When Victory is won, your highway construction plans will play a vital part in making jobs for returning service men and workers now in war industries. It is desirable and important that these plans be ready.

It is also important that they be truly "plans for the future." Postwar highways must not be subject to the ills of so many of our present roads, where annual breakups hike maintenance budgets and delay traffic.

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WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

Vol. 131 JULY 29, 1943 No. 5

COMING NEXT

• Beginning the first of a series of articles by *ENR's* European War Correspondent Waldo G. Bowman, editor of *News-Record*, covering activities of American engineers and construction forces in the European theatre of operations. Mr. Bowman's article to appear in the Aug. 12 issue is concerned with design, construction and equipment problems of the first big U. S. Army bomber bases in Britain.

• The difficulties involved in locating the Inter-American Highway through Central America, bringing in supplies and housing the workmen—described in this issue—will be followed by Part II in the Aug. 12 number, which covers the problems experienced in grading, surfacing and bridge building work through Guatemala, El Salvador, Honduras and Nicaragua.

• Fred Lavis, New York consulting engineer, in *ENR* for Aug. 12 takes issue with author C. J. Seibert concerning the proposed waterway from Venezuela to Argentina described by Mr. Seibert in *ENR*, Mar. 11, p. 360, and develops some interesting facts and figures to show the economic fallacy of such an adventure in Latin America.

LOOKING AHEAD

• In various parts of the country the Navy has completed or has under construction several large timber arch structures for docking its Lighter-Than-Air Craft. Each structure is being erected by an entirely different method. At a West Coast station 237-ft. span arches were erected progressively from scaffolding carried on 18 flatcars arranged on six parallel railroad tracks. Details of erection will be described in an early issue.

• The recent failure of a 50-ft. high firewall in a 32 mph. wind at a war plant started an investigation, which lead to an exhaustive study being made of city building codes throughout the country with respect to brick wall structures. Many inadequacies were found to exist. In an early issue H. A. Sweet, engineer for Associated Factory Mutual Ins. Co. will discuss the problem of designing brick walls for wind resistance.

PAGE

The Week's Events 53
Comment and Discussion 60
Editorials 62
Heavy Timber Trusses Carry Timber Arches ALFRED ZWEIG 64
Indiana Highway Bridges Designed to Carry 90-Ton Trucks 67
Concentric-Ring Concrete Water Tank for Topeka 68
A Weir with Flow Proportional to Head EDWARD GERALD SMITH .. 72
Labor Urged to Promote Plans for Postwar Construction 73
Production Line Shipbuilding with Preassembled Sections 74
Shield Tunneling 100 Years Ago H. W. RICHARDSON 78
Cities Increase Postwar Planning 80
Building the Inter-American Highway 83
Unit Prices 98
New Aids to the Constructor 100
Manufacturers' Activities 102
New Trade Publications 104
Men and Jobs 106
News of the Week 108
Meetings 112
Construction Reports 123

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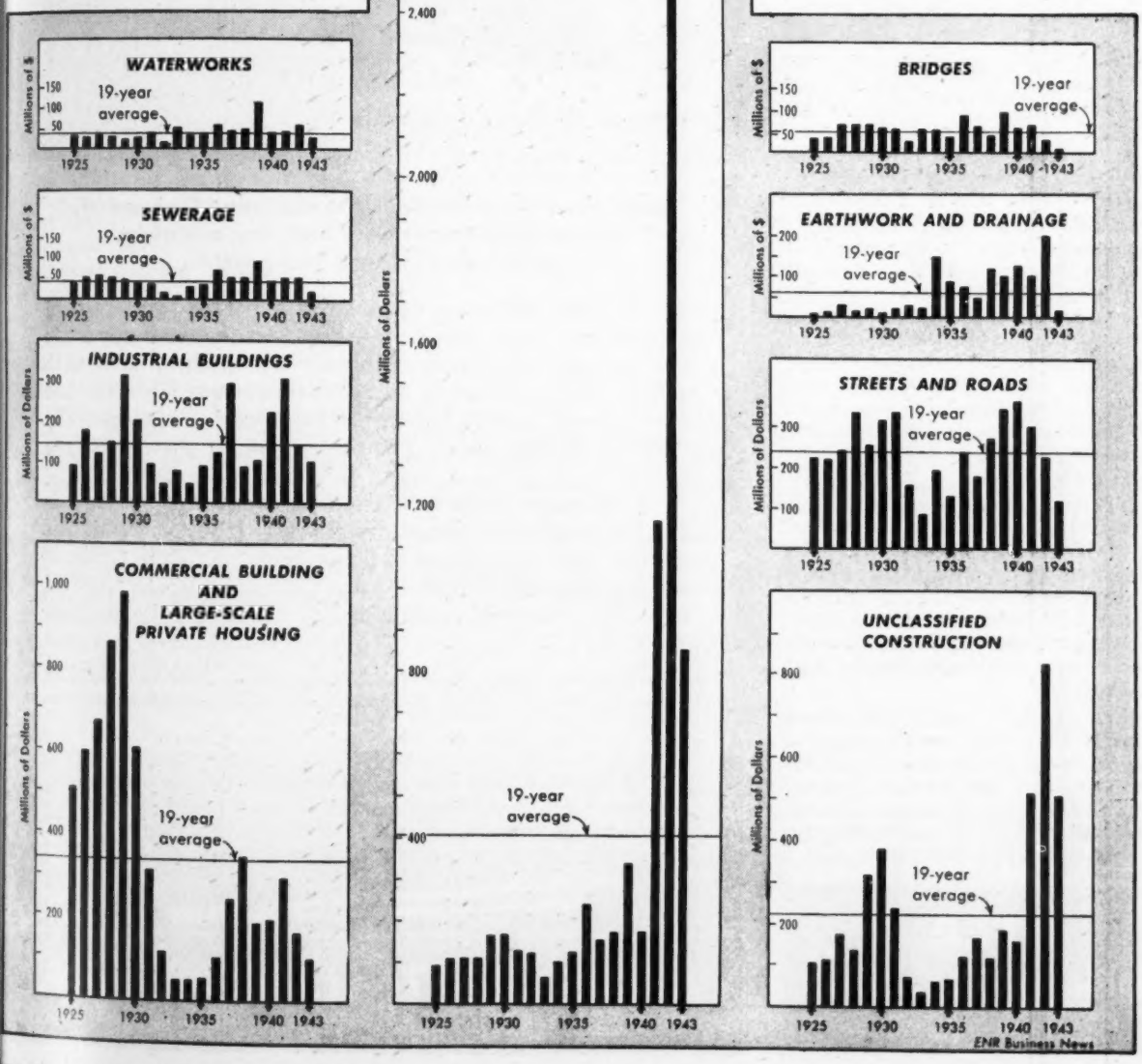
All Classes of U. S. Construction Lower

Six-month 1943 volume below '42 peak as preparatory phase of war construction in U. S. nears completion; unreportable projects hold down statistics.

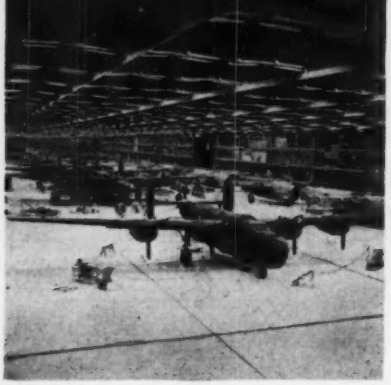
THE CHANGE of emphasis in war construction from the preparatory phase here in this country to the building in overseas theaters of operations, and unreportable construction project volume resulting from strict war censorship, are important contributing factors in the 63 percent decline in continental U. S. construction statistics for the first six months of 1943.

This year's reportable volume, though below the record war construction of 1942 and the defense-accelerated total for the six months of 1941, is higher than all other first half totals reported since 1930.

Public buildings and unclassified construction, both heavily weighted with war projects, are 72 and 36 percent lower than their respective volumes for a year ago. Each of the above classes, though, is more than double the average opening six-month figure reported in the years from 1925 to date.



LIGHT FROM FLOORS speeds war production



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ENR-F-20

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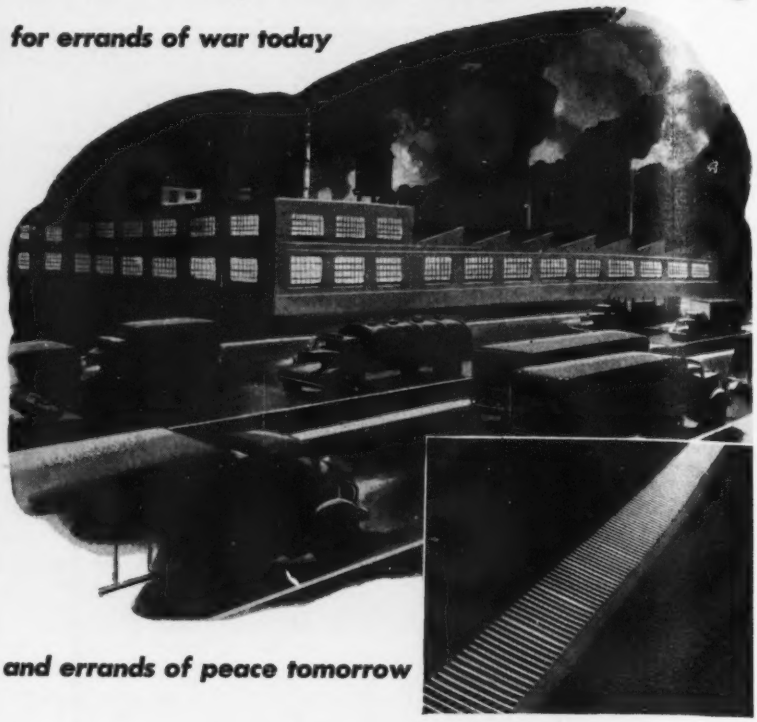
for errands of war today



and errands of peace tomorrow

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White Concrete Reflecting Curb is one important assurance of safety for the fleets of trucks which are speeding vital war cargo along our highways. Miles of this new safety curb, made with Atlas White cement, are in use today on pre-war highways and military roads. And everywhere it is being used, it is successfully promoting driving safety. The diagram below shows you how and why.

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ENR-M-40

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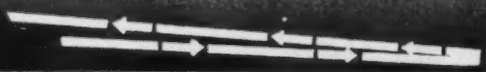

ATLAS WHITE CEMENT
for white concrete reflecting curb

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JULY 29, 1943 • VOLUME 131 • NUMBER 5

Three billion dollars asked for postwar highway projects

Hearings expected when Congress reconvenes on bill sponsored by the American Association of State Highway Officials. Money would be used for both urban and rural roads.

Appropriation of $3,000,000,000 for postwar highway construction and "to provide for the immediate preparation of plans and acquisition of rights-of-way, to cushion the postwar conversion to peacetime economy, and for other purposes" is authorized by a bill on which hearings are expected to start soon after the Congress reconvenes. The bill, which supplements the Federal Highway Act, and has been referred to the Post Office and Post Roads Committee in the Senate and the Roads Committee in the House, was sponsored by the American Association of State Highway Officials.

It makes $1,000,000,000 available each year for three successive years immediately after the war. Within 30 days after passage, funds for the first year would be apportioned to the states, and authorization for obligation for the first year's construction would be made immediately after the war. The spirit of the proposed act is to assure those states which now are making plans and acquiring rights-of-way for postwar highway projects that they will receive refunds for part of the cost of those highways when actual construction can be put under way. In case materials and manpower became available before peace, work could start earlier, upon direction by Congress.

Higher federal aid

As a departure from the Federal Highway Act, under which federal-aid funds are matched by the states, the $3,000,000,000 fund could be used to defray three-fourths of the cost of projects. States in which federal lands embrace more than five percent of the total acreage are allowed a percentage of the remaining one-fourth of the cost, in proportion to the extent of such lands.

Another departure from the highway act is that instead of apportioning funds on the basis of one-third each on the basis of population, area, and mileage, as is done in the present act, increased weight is given to population in the new bill which proposes one-half on population, and one-fourth each on area and mileage. Giving increased weight to cities, it is believed, will be particularly well received in Congress because it will concentrate employment where there is the greatest demand for it.

Half of the money apportioned each year is to be available for projects on the federal-aid highway system, and half for projects in urban areas and for secondary and feeder roads. The division between urban projects and secondary roads is proposed to be made in the same proportion that urban bears to rural population, in each state.

Interregional highways

The measure also provides for an "Interregional Highway System," not to exceed 40,000 miles, to connect the principal metropolitan areas and industrial centers with each other, and with important continental routes in Canada and Mexico. Any of the routes designated which are not already a part of the federal-aid highway system are to be added to that system.

State highway departments, which by joint action are to select the routes within their particular census region, will have use of the report which the Commissioner of Public Roads is to make to the President and to the Congress in the fall. An amendment to the Federal Highway Act, recently approved by the President, directed the commissioner to make a survey of the need for a system of express highways, including the number of roads, routes, and approximate cost, and to report his findings, together with recommendations for legislation.

• • •

Floating power plants for government service

U. S. Army engineers are operating the first of four barges, 250-feet long, costing (all four) $13,000,000 and capable of producing at capacity 30,000 kilowatts of electric power—sufficient to supply power for several war-production plants, or in an emergency an entire town the size of Topeka, Kan.

Mobility of the barges makes them twice as useful, according to J. A. Krug, director of the Office of War Utilities.

The builder of the barges is the Bethlehem Steel Corp., Leetsdale, Pa.

British postwar building problems

By Waldo G. Bowman
Editor, Engineering News-Record

London, July 26, by Cablegram—Lord Portal, British Minister of Works, last week selected a mission to visit the United States to study American building methods and costs. The members are A. C. Bossom, architect and member of Parliament; Sir George Burt, chairman of the Building Research Board; Sir James West, director of postwar building for the Ministry of Works; and Frank Jolstencroft, labor union official.

Parliament has criticized the Ministry of Works for allowing building costs to double during the war. It was charged that piece rates were fixed too high—2.2 cents per brick laid as compared with 0.7 cents before the war.

The Ministry of Works said material cost are not out of line. Brick is up 51 percent, cement 44 percent, steel 48 percent, skilled labor 23 percent, and common labor 29 percent, as compared to 36 percent for all industry.

The appointment of the mission to visit America and the parliamentary debate are both considered symptomatic of the concern over Britain's ability to carry out needed postwar building without huge subsidies, and with an inadequate supply of skilled labor.

F.T.C. orders the cement producers to abandon delivered-price system

Current practice that results in identical delivered price for all mills regardless of distance held to be monopolistic.

After six years of taking evidence, the Federal Trade Commission has issued an order forbidding members of the cement industry to combine to sell cement at prices arrived at by use of the multiple-basing-point delivered-price system. The commission claims the multiple-basing-point system maintained artificial and monopolistic prices. The order will go into effect at the end of 60 days from July 23 unless the industry gets a restraining order from a federal court in the meantime.

The order is directed at the Cement Institute and 75 member corporations which produce and distribute over three-fourths of the portland cement manufactured in the United States.

Substantially all sales of cement, the commission found, are made on the basis of a delivered price, as determined by location. The formula used is the lowest combination of base price plus all-rail freight which would be charged by the plant nearest the delivery location. If necessary in order to meet this price, a mill farther distant will shrink its mill net, the commission states, so that identical delivered prices inevitably result for cement delivered to any given location by all sellers using the formula.

The order specifically forbids The Cement Institute and its member corporations to enter into agreements with each other or with any outside party to sell cement at prices determined by the multiple-basing-point delivered-price system, or any other system which results in identical price quotations at points of sale, or any system which prevents any price advantage to a purchaser in dealing with one firm rather than with another. The order restrains the producers from arriving at f.o.b. mill prices by deducting actual common-carrier transportation charges from the delivered-price quotation. Also barred are methods of computing prices that deprive the government of the benefits of land-grant rates.

In connection with the above prohibitions, the order forbids a producer to refuse to sell at a price effective at the mill; and forbids it to refuse to allow purchasers to provide transportation by whatever means, at any cost, or to any place they desire. At one time, the commission found, firms discouraged the use of trucks by adding 15 cents a barrel to the mill base price for delivery to trucks at the mill.

Under the order producers are forbidden to do the following: collect or use information concerning transportation as a factor in the price of cement; control destination or use of cement after purchase; determine or use any determined basis for classification of customers; compile data concerning stocks or shipment of cement by one mill to another; determine or use discounts; use espionage to find out if customers buy imported cement and refuse to sell to those who do buy imported cement.

Price discrimination among customers; and use of any other means similar to those outlined, in order to accomplish anything prohibited by the order, are also expressly forbidden.

• • •

An improvement program for downtown St. Paul

A program for improving the downtown section of St. Paul, Minn., to stimulate business and industry in the central business district is being worked out.

The Minnesota Legislature has created a Central Business District Authority for St. Paul, consisting of nine members. Included in its powers are the taking over of property by condemnation, gift, purchase or tax forfeiture and using such property for the best interests of the city. The authority will set up parking lots or parking garages, to be operated by the authority or leased, and it may operate a transportation system to carry customers from the parking places to their final destination in the downtown loop district of the city.

The authority would have power to issue bonds up to twenty million dollars and to levy necessary taxes on the real estate within the central business district to support its activities. This district is to be within the Downtown Circuit Traffic-way as laid out by the St. Paul Planning Board. For the present the authority will be permitted to expend $25,000 to make surveys and prepare detail plans and cost estimates which are to be submitted to the legislature.

• • •

Army engineers demonstrate war activities

Work of the Corps of Engineers, U. S. Army, was demonstrated by 250 troops July 24 and 25 at Orchard Beach, New York City. Several thousand spectators were present for the demonstration, which was planned to aid the corps in its drive to recruit 100,000 engineers and construction workers.

Activities demonstrated included: laying of mines, camouflage protection, construction of barbed wire entanglements, and installation of ponton bridges. Also much special equipment was on display.

The demonstration was staged under the direction of Brig. Gen. B. C. Dunn. Lt. Col. Austin D. Smith was in direct charge. Members of Colonel Smith's staff made known that men wishing to join the U. S. Engineers may contact any division, district or area office of the Corps or a post engineer.

News Association Photo

Engineers aid invasion of Sicily

The photograph reproduced above shows the United States Army engineers laying down a road on a sandy Sicilian beach to facilitate the landing of equipment from the invasion boats during the successful operation which began on July 10.

Notes from THE YUKON

By H. W. Richardson
Western Editor, Engineering News-Record

This is the first report from H. W. Richardson who is on his second trip to the Yukon and Alaska to report on how the Alcan Highway survived the winter and to visit other operations of the Army Engineers in that region.

WHITEHORSE, YUKON TERRITORY.
Friday, June 25, 1943.

Covering the Alcan Highway the second time is quite different from the first trip over the line last fall. This time, after arriving at Edmonton, Alberta, June 16 and after spending a day at Gen. Worsham's division-engineer headquarters I was lucky enough to get space on a Canadian Pacific plane direct to Whitehorse, landing only at Grand Prairie and Fort St. John enroute. Last year this same stretch was made by a 24-hr. 500-mile train trip to Dawson Creek and then by jeep over the partly built highway.

Side trip to Skagway

From Whitehorse, center of all Alcan and Canol (oil pipeline) activity, I have made several trips into the surrounding territory as high-spot excursions. First was a run to Skagway, Alaska, and back over the army-operated White Pass and Yukon Route narrow-gage railroad. We went down at night on a freight train, riding in an old passenger coach, fitted with wooden benches, that served as a caboose. It was a beautiful trip, especially along Lake Bennett, where the railroad winds along the mountain-rimmed lake shore for 27 miles. A full moon augmented the midnight twilight. We rolled our sleeping bags out on a bench and caught a few catnaps. Freights take 11 hr. to make the 110-mile trip.

The army, under Lt. Col. Wm. P. Wilson, of the Burlington and Major B. C. Baughn, from the Sante Fe, is doing a swell job in operating the railroad. Last winter they were up against terrific odds in battling snow, but tonnage has increased every day as the weather got better and more power and rolling stock was received. Several narrow-gage engines from the D. & R. G. W. R. R. in Colorado and some new power, built for meter-gage foreign service and squeezed down for the 3-ft. W. P. & Y. R. have put the railroad on a sound operating schedule.

Makeshift unloading facilities at Skagway have been replaced with substantial arrangements for handling cargo. We came back to Whitehorse the next night in a caboose, with little sleep, but it was light enough to view the scenery all night long.

Next was a trip to Kluane Lake by car with the army, and this 150-mile stretch of the Alcan is in excellent shape. Stayed with Bud Munson of E. W. Elliott Co. at his fine camp at the foot of the lake. Next day we drove along the lake for 50 miles to Duke River, where Martin Wesley, of Bates & Rogers Construction Corp., is getting ready to build a bridge. A plane was supposed to pick us up at Burwash Landing for Fairbanks, but the pilot got his instructions all balled up. He was three hours late, which is nothing in the Yukon, and upon arrival said he was supposed to go to Whitehorse for more passengers and then to Fairbanks. By the time we got to Whitehorse his passengers were gone and it was too late then to make the trip, considering lack of accommodations in Fairbanks, so we called it off.

Flying to Norman Wells

Then Gen. James A. O'Connor, chief of the Northwest Service Command, invited me to accompany him in his twin-motor Lockheed Lodestar, the "Joker," to Norman Wells, way down the MacKenzie River in the shadow of the Arctic Circle. We tried to follow the Alcan as far as Ft. Nelson, B. C., to check up on road building activity, but ran into a bad storm east of Watson Lake. Capt. Hinz, our pilot, turned tail up the Liard Valley to gain altitude and then cut over to the radio beam. We climbed to 13,000 ft., but were still in the clouds. The air temperature dropped to five below zero, and the plane iced up. However, after a couple of hours of blind flying Hinz dropped us neatly onto the Ft. Nelson airport for lunch. Then we had a nice 650-mile flight to Norman Wells.

The MacKenzie is a majestic river, flowing through a valley 50 miles wide at Norman, about 350 miles from the mouth. Here the stream is nearly four miles wide. We made several crossings in a small assault boat—a real thrill. Can't say much about the Canol operations at Norman Wells, but some day we hope to have a swell construction story on them.

Route of the Alcan Highway and its supply lines. The connection from Haines is now under construction to relieve the load on the W. P. & Y. R.

Looking for pipe-line routes

The next day Gen. O'Connor wanted to investigate the proposed and alternate pipeline routes through the MacKenzie Mountains to the west. This was a grand flight over some of the wildest mountain country I have ever seen. Existing maps of the region are inaccurate, so the general asked Capt. Hinz to check the elevation of prominent peaks. We in the back of the plane didn't know what was happening when Hinz sailed so close to the tops of the peaks that he had to flip a wing to keep from slicing off the mountain—Oh well, they tell me this gray hair is quite becoming.

Today we flew back to Whitehorse over the proposed pipeline route, a most instructive and enjoyable trip.

Most of the highway is open

From what I hear and have seen the Alcan is in fairly good shape except, I'm told, a 75-mile stretch south of the Alaska border, built in a hurry over frozen ground late last fall. This stretch apparently went out with the ice. Utah Construction Co. has the job of rebuilding it.

All work on the main highway this year, including the permanent bridges, is being done by contractors working for the Public Roads Administration, under the general direction of the Army Engineers.

• • •

Alaska Highway name is changed once more

Agreement on "Alaska Highway" as the official name for the highway from Dawson Creek, British Columbia, to Fairbanks, Alaska, was announced July 22, in an exchange of notes between the United States and Canadian governments.

News of Mississippi River Bridges

The St. Louis Municipal Bridge Commission has recommended that the Board of Public Service grant the St. Louis Southwestern (Cotton Belt) Railroad a permit to run two passenger trains daily over the Douglas MacArthur Bridge across the Mississippi River. The road will pay upwards of $7,000 annually for this use of the railroad deck of the bridge. Each train will save about 10 miles per trip in comparison with the present route used to enter St. Louis. The city is planning to raise and ballast the tracks of the eastern railroad approach to the bridge commencing at the east abutment at 21st Street, thence eastwardly 2800 feet in the City of East St. Louis, Ill. Engineers in the Department of Public Utilities have estimated the work will cost about $8,000.

Just before Congress recessed recently, Senator Hattie W. Caraway, of Arkansas kept alive the dream of a bridge across the Mississippi River in the vicinity of Friar Point, Miss. and Helena, Ark. An act creating an Arkansas-Mississippi Bridge Commission and authorizing it to build and operate the bridge had been allowed to expire. Mrs. Caraway introduced a bill revising the act, first passed by Congress on May 17, 1939. The time limit for starting the bridge was extended in 1940 and again in 1941. The new bill says that if the bridge is not begun within a year after approval, the act will become void. When the Arkansas senator was asked if she believed construction would start within a year, she replied she didn't know but wanted Congress to authorize the project again so that the work can begin whenever the commission finds it possible to go ahead.

The proposed new Mississippi River bridge at Memphis is probably out for the duration of the war, according to Governor Homer Adkins of Arkansas. This despite the fact that the Arkansas State Highway Commission transferred $200,000 from the construction and maintenance fund to a new Memphis bridge fund. This was done so that the state could match amounts that may be put up by the federal government and the state of Tennessee.

It is expected that a special election will be called in the near future at Vicksburg, Miss., to allow the citizens to decide whether to issue bonds with which to purchase the privately-owned Mississippi River bridge at Vicksburg. Mayor J. D. Hamilton expressed the belief that the city could purchase the bridge for from $500,000 to $1,000,000 below previously discussed figures. If the city should purchase the bridge it is planned to issue revenue bonds, and, upon final retirement of these bonds, make the bridge toll-free.

• • •

Florida Keys project to be finished this year

Florida's greatest road-building project, the 123-mile overseas highway from Florida City to Key West, is one-third finished and its final completion date is set as Dec. 1, 1943.

Chairman Thomas A. Johnson and Chief Engineer J. H. Dowling of the Florida state road department both agree that if nothing serious occurs to delay construction work, the Overseas Highway, renovated from end to end and shortened by 17 miles, will be ready for service in five months.

This 22-ft. roadway originates at the tip of the Florida peninsula and winds southwesterly into the Caribbean, crossing 32 small islands of the Florida Keys which are linked together by bridges ranging from a fraction of a mile in length to one nearly 10 miles long. The highway is being constructed over the right-of-way of the abandoned Florida East Coast Railroad, a $25,000,000 dream of the late railroad king, Henry M. Flagler.

Ohio highway bridge in Wills Creek Dam drainage area is raised

Recently the highway bridge on State Route 75 over White Eyes Creek in Coshocton County, Ohio, was raised 7 ft. to be above the upper pool level of the Wills Creek Dam in the Muskingum Watershed Conservancy District. Built during the winter of 1931-1932, the old crossing was in excellent condition. It had a timber deck on steel girders supported by timber bents.

In the raised position two approach spans, one of 26 ft. and the second 30 ft., had to be built. To save steel, the approaches were constructed of timber, the laminated deck being built of 3x10-in. planks.

The new construction was by Kent Bros. Co., Columbus, Ohio.

Plans for the construction work were prepared in the bureau of bridges, Ohio Department of Highways, H. G. Sours, director of highways, and W. S. Hindman, chief engineer for the department.

Engineering and industrial notes from four cities

Baltimore, Md.—Ezra B. Whitman, chairman of the Maryland State Roads Commission, said July 12 that: "The best interests of the city of Baltimore have been kept in view by the commission in its support of the federal-state plan to construct a bridge across Baltimore harbor." Whitman made the statement in reply to an assertion by John D. Steele, chairman of the City Plan Commission, that the roads commission is not concerned with the effect the bridge would have on the city and that the proposed span is merely looked upon as a cheap way to by-pass the municipality.

Mr. Whitman has denied the Roads Commission's authorship of the plan and said: "The plan has been studied and approved by so many engineers that you can't call it the work of any one person or any one group."

It has been planned to build the harbor bridge from Fairfield to Canton as a postwar project to be tied in with highway routes across the northern part of the city.

The federal government is expected to share the cost of building approaches to the bridge, which will be paid for with tolls. The city also expects to get federal aid for the highway routes through the northern part of the city.

At a meeting in Washington last January, Thomas H. MacDonald, commissioner, of the Public Roads Administration, declared that the construction of the harbor bridge would in no way interfere with a program of federal aid for highways through the northern part of the city. Mr. MacDonald asserted that he is of the opinion that the two projects are essential if a well-rounded traffic program is to be worked out for Baltimore.

This whole proposition will be considered by the newly appointed Maryland Commission on Postwar Reconstruction and Development.

Wilmington, N. C.—This city, which has experienced rapid wartime growth, reports that water consumption in the city during the fiscal year ended June 30 totalled nearly 175 million gallons more than was used during the previous year. Water consumption during the year totalled 1,346 mg. according to McKean Maffitt, superintendent of the department, compared with 1,171 mg. during the previous year. The present water plant at Wilmington soon will be supplemented by a $500,000 plant now under construction.

Seattle, Wash.—Bonneville Power Administrator Paul J. Raver, on July 3, announced completion of an industrial survey of Seattle and the surrounding territory in King County, Wash. It is the tenth in a series of reports on Puget Sound communities being prepared by Bonneville's market development section. Material for the survey was compiled largely from reports prepared by business groups of the metropolitan area, cooperating through the Seattle Chamber of Commerce.

"The postwar aspects of the Seattle survey are particularly significant in view of the tremendous strides which will be made in commercial aviation after the war," says the report. "Because of its geographically favorable location, Seattle should develop as one of the nation's most important air terminals for flight lines to Northern Asiatic and European points. A second factor bearing on the postwar outlook of the Northwest's leading seaport will be the development of Alaska and its wealth of mineral resources. The survey shows that 90 percent of Alaska's total commerce is handled through Seattle."

The report lists 32 potential industrial sites containing a total of 1,621 acres, as well as several additional areas, which are suitable for industrial development. Most of the sites are adequately served by power, water, gas and railroad facilities.

Seattle's position as a leading world port, with a water-borne commerce averaging eight million tons in recent years, is pointed out in the survey, which states that prior to the war, approximately 60 steamship lines connected the city with all of the principal ports of the world.

Power for Seattle and most of the immediate suburban area is furnished by the city's municipal department of lighting and the Puget Sound Power and Light Company. Through interconnection with the Bonneville-Grand Coulee power grid both systems are part of the northwest power pool, an interconnected network of all the major public and private electric utilities in five northwestern states.

Philadelphia, Pa.—The city's 47-year old suit to halt Schuylkill River coal-culm pollution must be started over again. On July 13 the State Supreme Court dismissed the city's recent effort to revive an 1896 action against two of the original coal defendants and to add 22 additional companies. Acting Mayor Samuel announced at once that a new suit will be filed. He said:

"The pollution of the river is threatening the water supply of the city and endangering the safety and welfare of all the inhabitants of the Schuylkill River Valley. This condition is a serious threat, and a serious interference with the war effort."

Contractors discuss markets for construction

Nearly 200 executives of the many branches of the Associated General Contractors of America met in Chicago recently to discuss the part contractors can play in the war effort and in the postwar period (ENR July 8, p. 107). Here shown are the executives who were largely responsible for the success of the meeting. Left to right they are H. E. Foreman, managing director; O. B. Coblentz, president and Wm. Muirhead, vice president.

JOBS OF THE WEEK

HOUSING, Michigan
Public Housing Authority, Cleveland, O., awarded a contract to build housing to Benjamin Chemers Co., Chicago, Ill., frame construction, at $598,000. Eberle M. Smith, Highland Park, Mich., is architect.

HOUSING, Leetsdale, Pa.
P. Gentile, care of S. R. L. Rosseau, architect, Pittsburgh, Pa., has awarded contract for the construction of ninety, 2-family dwellings to Stevens Building Co., Wilkinsburg, Pa. The estimated cost is $656,000.

HOUSING, Ohio
John A. Johnson Sons, Brooklyn, N. Y., was lowest bidder on prefabricated housing when the Public Housing Authority, Cleveland, O., opened bids at $596,980. Akron Associated Architects, Akron, O., are the architects.

PRODUCTION OVERHAUL AND PROOF SHOP, Pocatello, Idaho
Winston Brothers Co., C. F. Haglin & Sons, Inc., Missouri Valley Bridge & Iron Co. and Sollitt Construction Co., Inc., Minneapolis, Minn., will construct production overhaul and proof shop, at Naval Ordnance Plant, for the Bureau of Yards & Docks, Navy Dept., Washington, D. C. The estimated cost is $1,144,000.

HOUSING, Litchfield Park, Ariz.
Goodyear Aircraft Corp., Litchfield Park, awarded contract to P. W. Womack Construction Co., Phoenix, for Westwood Manor housing development to cost about $1,000,000. Work includes two hundred homes, on forty acre tract. FHA will finance. Lescher & Mahoney, Phoenix, are architects.

AIRPORT, Fernandina, Fla.
Civil Aeronautics Authority, Atlanta, Ga., awarded the contract for an airport to C. G. Coffee Construction Corp., Eastman, Ga., at $1,005,000.

AMPHIBIOUS FACILITIES, Coronado, Calif.
Bureau of Yards & Docks, Navy Dept., Washington, D. C., awarded contract to Zoss Construction Co., Hollywood, Calif., for amphibious facilities, at Amphibious Training Base, at $1,703,304.

AVIATION FACILITIES, Cherry Point, N. C.
T. A. Loving Co., Goldsboro, N. C., received letter of intent from Bureau of Yards & Docks, Navy Dept., Washington, D. C., for the completion of aviation facilities, Marine Corps Air Station.

HOUSING, New Jersey
John A. Johnson & Sons, Brooklyn, N. Y., will construct housing for Public Housing Authority, New York, N. Y., at $759,000. Jay Van Nuys, Somerville, N. J., and Hugh A. Kelly, Jersey City are the architects.

HOUSING, Ohio
Public Housing Authority, Cleveland, O., awarded contract to build housing to Frank Messer & Sons, Inc., Cincinnati, O. Project will cost $702,950. Walter J. Thies & Associates, Dayton, O. are the architects.

IMPROVEMENTS, Texas
U. S. Engineers, Albuquerque, N. M., will construct improvements, Presidio County, to cost $1,380,000. Ernest Lloyd, Fort Worth, has been awarded the contract.

EARTHWORK AND STRUCTURES, Friant, Calif.
Larsen Brothers and Harms Brothers, Sacramento, Calif., were the lowest bidders when the Bureau of Reclamation, Sacramento, Calif., opened bids. Work includes constructing earthwork and structures, Madera Canal, Friant Division, Central Valley Project, and will cost $587,588.

HOUSING, Mississippi
Algernon Blair, Montgomery, Ala., will construct housing, for Public Housing Authority, Atlanta, Ga., at $967,416.

HOUSING, Arvida, Que.
Wartime Housing Ltd., Toronto, Ont., awarded the contract to build three hundred homes to Hill-Clark-Francis, Ltd., New Liskeard, Ont. Estimated cost is $1,000,000-$1,250,000.

HOUSING, Utah
Robert E. McKee, Los Angeles, Calif., was lowest bidder constructing housing when Public Housing Authority, Kansas City, Mo., opened bids at $957,000. Ashton, Evans & Hodgson, Salt Lake City, Utah, are the architects.

PROPELLER FACTORY, Wisconsin
Hunzinger Construction Co., Milwaukee, Wis., will construct 1 and 2 story, 340x440 ft. propeller factory, with 1-story, 60x120-ft. garage and 50x120-ft. boiler room, for Defense Plant Corp. Estimated cost is $721,634. A. O. Smith Corp., Milwaukee, is the operator.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 123.

Public Works director dies in Kansas City

Arthur C. Everham, 66, director of Public Works, Kansas City, Mo., died July 22. Mr. Everham was appointed to his Kansas City post in May, 1940. He had been assistant tunnel engineer for the New York Central Railroad in the construction of the railroad's tunnel under the Detroit River, in Detroit. He went to Kansas City in 1911 as assistant chief engineer for the Kansas City Terminal Company, in construction of the Union Railroad Station. During the first World War he was assistant in charge of building 78 large munition plants for the government.

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C. F. Seifried dies, Wyoming highway head

Charles F. Seifried, 58, superintendent of the Wyoming State Highway Department, died July 21 of a heart attack while on an inspection trip at Cody, Wyo.

Born in Chicago, Ill., Mr. Seifried received his engineering education at Stanford and Cornell universities. He was one of the oldest employees in the Wyoming highway department, having joined it in 1919. For many years he served as engineer of plans, and office engineer. In 1937 he was appointed superintendent-engineer of the department and two years later became chief highway engineer when Frank Kelso was appointed superintendent. Last January he was promoted to highway superintendent.

During his long association with the department he commanded the high respect of engineers and contractors throughout all of the western states for his ability as an engineer and highway administrator. He served as president of the Western Association of State Highway Officials in 1941; previously he had served as a vice president of the American Association of State Highway Officials. One of the strongest exponents of engineering advancement in the western states, Mr. Seifried had served as president of the Wyoming Engineers, as president of the Cheyenne Engineers Club, and for several years he was chairman of the Wyoming State Board of Examining Engineers.

OBITUARY

William H. O'Neil, retired member of the contracting firm of Frank B. and W. H. O'Neil of Hartford, Conn., died June 28. Mr. O'Neil was instrumental in the development and construction of many large sewer and water projects.

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John McCulough, 71, of West Allis, Wis., a civil engineer for the Wisconsin State Highway Commission for 6½ years died July 9. Previously Mr. McCulough had been city engineer at Fond du Lac, Wis. for 12 years, and county engineer and commissioner for Fond du Lac County for 12 years.

William Hamilton Hodges, 64, Shreveport, La., president and organizer of the Red River Valley Improvement Association, died June 27. He was a member of the group of Louisiana, Texas and Arkansas citizens who interested the government in the Denison, Tex., dam, key project in the river program. He also served as conservation commissioner.

Zechariah Chaffee, 84, president of the Builders' Iron Foundry, Providence, R. I., since 1889, died July 8. He was a native of Providence and a graduate of Brown University, serving that institution many years as a trustee and member of the corporation.

Paul V. Fredman, 58, for thirty years a civil engineer in the evaluation and tax department of the Texas & Pacific Railroad in Dallas, Tex., died there on July 19. Mr. Fredman was born in Kansas City, Mo., and was graduated from the engineering school of Missouri University, in 1910.

J. Herbert Ryan, 52, assistant Oregon state engineer, died July 10 at Salem, Ore. A native of Portland, he was graduated from the University of Oregon in 1916. He entered the state engineer's office in 1925 and became assistant in 1930. Mr. Ryan was nationally known for his hydrographic work in reclamation engineering.

Frank A. Stiers, 73, prominent in the construction business died recently in St. Louis, Mo. He was president of the Stiers Bros. Construction Co. He held basic patents for the asphalt strip road and developed tile sewer pipe. His company constructed a number of St. Louis streets and viaducts, including the 14th St. viaduct, where piers had to be sunk through quicksand more than 100 ft. deep. His firm installed Rocky Branch sewer, a system covering most of northwest St. Louis. He built waterworks for cities in many states.

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Board chosen to plan New York public works

Governor Thomas E. Dewey of New York, on July 16, completed his appointments to the Postwar Public Works Planning Commission. The latest appointees are: State Comptroller Frank C. Moore; M. P. Catherwood, state commissioner of commerce; and Charles D. Breitel, counsel to the Governor.

Previously the governor had appointed Budget Director John E. Burton, who is chairman of the commission; Senator Arthur H. Wicks and Assemblyman Abbott Low Moffat. Under a recently enacted law, membership of the commission was cut from ten designated officials to seven; four to be named by the Governor. The latter is said to feel that administrative officials, who may direct the postwar projects should not have a hand in suggesting them. That is why Robert Moses, New York City Park Commissioner, was not renamed and why Charles H. Sells, State Superintendent of Public Works, was not appointed.

The commission, which has prepared a 400-million dollar post-war program, was given an appropriation of three million dollars this year for the preparation of plans.

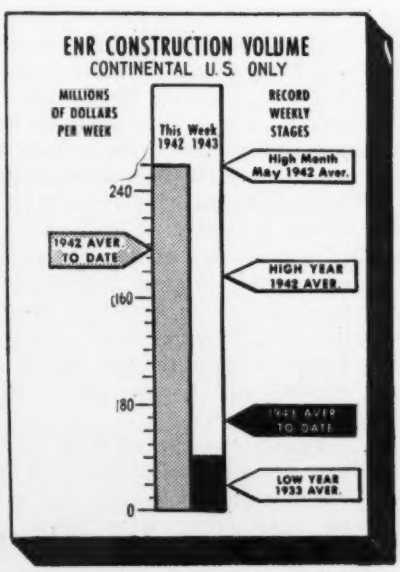
CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume in continental U. S. totals $41,154,000 for the week. This volume, not including the construction by military combat engineers, American contracts outside the country, and shipbuilding, is 16 percent lower than in the preceding week, and 84 percent below the total for the corresponding 1942 week. Private construction gains 23 percent over a week ago, but declines 58 percent from a year ago. Public work is 20 and 86 percent lower, respectively, than last week and last year as both state and municipal construction and federal volume report declines.

The current week's volume brings 1943 construction to $2,062,540,000, an average of $68,751,000 for each of the 30 weeks. On the weekly average basis, 1943 construction is 65 percent below the $6,106,820,000 for the 31-week period in 1942. Private construction, $255,188,000, is 35 percent lower than last year, and public work, $1,807,352,000, is down 67 percent when adjusted for the difference in the number of weeks.

In the classified construction groups, commercial building and large-scale private housing gains over a week ago. All classes of work are below their respective totals of a year ago.

New capital for construction purposes for the week totals $954,000, and is made up entirely of state and municipal bond sales. New construction financing for the 30 weeks of 1943, $2,921,188,000, is 68 percent lower than the $9,500,250,000 reported for the 31-week period in 1942.



CONTRACTS

Continental U. S. Only
(Thousands of dollars)

	Week Ending July 30 1942	July 22 1943	July 29 1943
Federal	$234,878	$36,917	$31,913
State & Municipal	10,034	6,997	3,034
Total public	$244,912	$43,914	$34,947
Total private	14,888	5,055	6,207
TOTAL	$259,800	$48,969	$41,154
Cumulative 1943 (30 weeks)			$2,062,540
1942 (31 weeks)			$6,106,820

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

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NEW PRODUCTIVE CAPITAL

	Cumulative 1942 31 weeks	1943 30 weeks
NON-FEDERAL	$533,352	$267,350
Corp. Securities	158,034	15,321
State & Mun.	164,199	91,896
R.F.C. loans	128,419	9,000
FPHA loans	.....	3,133
R.E.A. loans	.....	20,000
Fed.-Aid Hwy.	82,700	128,000
FEDERAL	$8,966,898	$2,653,838
TOTAL CAPITAL	$9,500,250	$2,921,188

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	July '43	289.92	139.36
Building Cost	July '43	227.89	123.19
Volume	June '43	204.	89.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

In Defense of WPA

Sir: I have been a subscriber to *Engineering News-Record*, and to its predecessor, *Engineering News*, since 1894, and in general I like its content. But I do not like your wholesale condemnation of WPA when neither you nor any other organization was able to propose any better solution at the critical time it was needed.

With all its faults, WPA was far better than outright dole, which would have increased idleness, laziness and crime, and yielded no return of structures, etc., for the money outlay.

Of course, much, if not most, WPA construction could have been done for less money, but I have seen numerous WPA jobs that were very well executed under engineering design and supervision. Economy is not always the most important consideration. War is certainly not economical financially, but it is necessary just now. If people's lives are worth saving in times of depression, either a dole system or some better solution is necessary. I think the WPA was better than dole, even if it did not give employment to all the contractors, and even though it was too much "hooked up" with politics in some states.

H. P. BOARDMAN
Emeritus Professor of Civil Engineering, University of Nevada
Reno, Nev.

Why Use Substitutes

Sir: Your article on "Engine Test Cells Designed For Sound Reduction," June 3, p. 812, told an interesting story of much timely value. Unfortunately it contained one error which is sufficiently important to warrant correction through the medium of your advertising pages in today's issue.

In describing the sound insulation employed to achieve very high efficiencies in noise reduction, you state that "Specifications, as originally written, provided that the sound insulation should consist of perforated metal with baked enamel finish, backed by glass fiber. However these are critical materials and substitutes for both were found. . . ."

Glass fiber, or Fiberglas, of the type used in engine test cell sound proofing and in "sound stacks" built under specifications jointly developed by the Army Air Forces and the Corps of Engineers *has never been a "critical material."* It is not critical today. It can be obtained without undue delay and in adequate quantities for projects of this type anywhere in the United States.

We believe your readers should be informed of this fact because, as your article so excellently states, "the reduction of 16 decibels actually obtained in the tunnel is considerably less than the calculated absorption of 25.8 decibels which was expected to be attained with specially perforated metal and fiber glass." Exceptional performance of Fiberglas wool in many of these applications where it must withstand very high wind velocities and weather exposure, and must be subjected to periodic cleaning for the removal of inflammable greases and oils, justifies the preference given to this material in the governing specifications.

Tests made at Riverbank Laboratories and many applications in various fields of sound reduction show that the perforated facing material may be almost any substance that permits the sound waves to reach the absorbing wool. Tests made on perforated asbestos and perforated metal having a similar ratio of voids to solid areas show substantially identical results. Therefore designers may expect to get the same high absorption with Fiberglas faced with perforated asbestos sheeting that is attributed to Fiberglas faced with perforated metal.

Recent relaxation of WPB limitation orders governing expanded and perforated metals indicates that even the metal facing is no longer so critical that it could not be used in sound stacks and engine test cells associated with the production of war materiel.

The project described in your article showed exceptionally fine results. The engineers who designed it and the contractor who built it should be commended for their skill in design and their ingenuity in solving a difficult problem so effectively without the materials preferred for these applications.

It is unfortunate that they did not know Fiberglas wool has never been classed as a critical material. Possibly some temporary local shortage in distributor's stocks was misconstrued, or else the fact that Fiberglas textile products are under allocation created the impression that all forms were in the same category.

We trust that other readers will not be led by your article to use substitutes in future installations of like character, when the most important specified material has been, and continues to be, available.

TYLER STEWART ROGERS
Technical Director,
Owens-Corning Fiberglas Corp.
Toledo, Ohio.

Following receipt of Mr. Rogers' letter we checked with engineers of the U. S. Engineer Department from whom information was obtained for the article in question. In reply they stated "When we attempted to follow the original specifications, the earliest delivery we could obtain for the sound insulation specified was 120 days. So far as we are concerned, that makes this insulation a critical material." Probably, as Mr. Rogers points out, this may have been due to local conditions that do not effect the general supply of glass fiber.—Editors.

Priority on Design Methods

Sir: I have read the comments by Prof. Gregory P. Tschebotarioff (*ENR*, June 17, p. 871) concerning my article, "Beam Method of Design for Eccentrically Loaded Columns," in which Prof. Tschebotarioff states that the Beton-Kalender, 1928-Edition, gives a method identical with the "Beam-Method" as presented by me.

The writer wishes to state that Ehlers' table in that book deals with columns only, and nothing is mentioned in the table or illustrative text

about beams, or any connection between beams and column design.

The table is worked in the following manner. For a certain fixed concrete stress you find coefficients for various steel stress—p and p' in formulas (4) and (5). These coefficients are used to figure out tension and compression steel areas. The sum of these areas should be a minimum, and this minimum determines for a fixed concrete stress the steel tension stress to use.

An improvement over this method has been given by the writer in *Civil Engineering*, February, 1943, "The Economy Method in Column Design."

Even with the limited use of the table, it must also be mentioned, that the table is based upon approximate assumptions and formulas that become very long and therefore will be hard to handle. (See (6) and (7).)

Now let us compare some of the statements made by Prof. Tschebotarioff. From the illustrative material preceding the Ehlers' Table he picks out some formulas as follows:

$$M_s = M + N\,(h/2 - d') \qquad (1)$$

The effective depth of the beam was to be found from:

$$d = \alpha \sqrt{M_s/b} \qquad (2)$$

where:

$$\alpha = 1/\sqrt{K'} \qquad (3)$$

The tension and compression steel was to be found from:

$$A_s = pdb - N/f_s \qquad (4)$$

$$A'_s = p'db \qquad (5)$$

$$K' = f_s\left[\left(\frac{2n^2 + 3rn}{6\,(n+r)^2}\right) + np'\,(1 - d'/d\left(1 - \frac{d'\,(n+r)}{d\,n}\right)\right] \qquad (6)$$

and:

$$p = \frac{n}{2r\,(n+r)} + \frac{p'}{r}\left[n - \frac{d'}{d}(n+r)\right] \qquad (7)$$

where: $r = f_s/f_c$ and $p' = \dfrac{A'_s}{bd}$

The writer has used the following formulas for the effective depth of a beam or columns respectively.

$$d = \sqrt{\frac{M}{Kb}} \qquad (Ia)$$

$$\text{and } d = \sqrt{\frac{M_s}{Kb}} \qquad (Ib)$$

where (K) may be found in standard textbooks. We have

$$K = \tfrac{1}{2} f_c kj$$

Prof. Tschebotarioff's value of K' (under certain condition it should be identical with K) is not easily usable for the following reason. The expression (6) gives a value of K' for a certain size columns (not beam) for a given amount of compression reinforcement steel (expression np'). But we do not know the compression steel.

The expression (4) is only approximately correct when referred to a beam design, because the expression pbd should then give the balanced amount of tension reinforcement. Thus the influence of the compression steel is neglected. The writer has given the amount of tension steel in a beam with compression steel as

$$A_s = \frac{M + \tfrac{1}{2} f_c bkd\,(kd/_3 - d')}{f_s\,(d - d')} \qquad (III)$$

that is mathematically correct.

If there is no compression steel, then d' can have any value, so by making it equal to $kd/3$, expression (III) becomes

$$A_s = \frac{M}{f_s jd} \qquad (II)$$

that now is identical with the first part of the right term of (4).

The expression (5) does not give any answer, because under (7) the value of p' is given as A'_s/bd, so the whole expression (5) cancels out.

The writer has given the amount of compression steel as

$$A'_s = \frac{M - \tfrac{1}{2} f_c bkd\,(d - kd/_3)}{f_s'\,(d - d')} \qquad (IV)$$

that is mathematically correct. Therefore the writer does not see any justification for any claim of priority for the Beton-Kalender.

At this time the writer also wishes to express appreciation for Prof. Tschebotarioff's broadmindedness in letting him give this talk to the civil engineering students of the School of Engineering at Princeton University. Quite a lively discussion followed the talk, and some valuable points were brought out by the students, that were incorporated in the article.

ODD ALBERT
Belmar, N. J.

Sharp-Crested Weir Flows

Sirs: Readers of the excellent paper "Submergence Effect on Sharp Crested Weirs," by John F. Vennard and Roy F. Weston, *ENR* June 3, 1943, p. 814, might be interested in a retrospective view of this subject as presented by the writer 33 years ago. "Experiments on Small Weirs and Modules" was the name of the article and it appeared in *Engineering News* Aug. 18, 1910, p. 171. Included in the article was the accompanying diagram, which makes available coefficients to be applied to the free-flow discharges to obtain the actual flow under conditions of submergence for almost any kind of a sharp-crested weir.

The accompanying table gives a comparison of the coefficients Q/Q_f from the analysis by Vennard and Weston with those from the writer's diagram. Since the lines in the diagram are straight, it is only necessary to select one upstream head H_2 and to find the several values of the downstream head H_1 corresponding to the ratios H_2/H_1 in the author's Figs. 2 and 3.

Coefficients of Different Workers for Submerged Weirs

H_2/H_1	A	B	C
.10	.99	.99	1.00
.20	.96	.96	.97
.30	.92	.93	.93
.40	.88	.89	.89
.50	.83	.85	.84
.60	.77	.79	.78
.70	.69	.71	.70
.80	.60	.61	.59
.90	.45	.46	.51
.95	.32	.32	.25

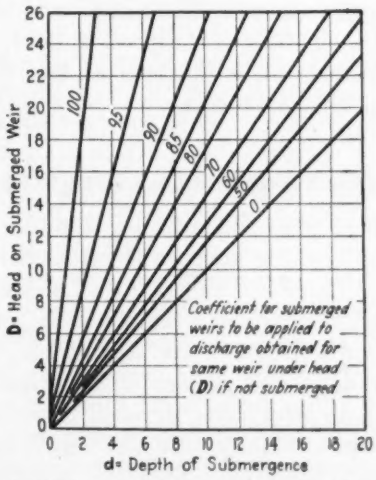
H_1 = Downstream head in work by J. C. Stevens.

H_2 = Upstream head in work by J. C. Stevens.

A = Average values of Q/Qf from experiments on rectangular suppressed weirs, by Frances, Fteley-Sterns, Cox, and Bazin for P/H = 8.

B = Values from experiments on rectangular contracted and trapezoidal weirs for P/H = 6 by V. M. Cone.

C = Values from diagram prepared by J. C. Stevens and published in *Engineering News*, Aug. 18, 1910, p. 171.



Coefficients to be applied to free-flow discharges of a sharp-crested weir to obtain flow with submerged condition.

Incidentally, the writer believes that carrying these coefficients out to the third decimal place is a refinement unwarranted in practice.

J. C. STEVENS
Stevens & Koon
Portland, Ore.

EDITORIALS

VOLUME 131 NUMBER 5

July 29, 1943

It's Still the Alcan

LAST WEEK, by a solemn exchange of notes between our State Department and the Canadian Government, the "Alcan Highway" was formally renamed the "Alaska Highway." This is the third change in name for that famous road in less than a year. It started out as the Alaska Highway, but the husky American and Canadian construction men who were assigned to the great task of building the road wanted something more distinctive. With General O'Connor's blessing they called it the "Alcan Highway." A few weeks ago General O'Connor's headquarters announced that the name had been formalized as the "Alaska Military Highway." This name the two governments now have changed back to its original form. Doubtless this will continue as the formal title, but to the men who built the road it will always be the Alcan Highway. That name is written into the glorious record of their toil; it cannot be lightly erased by the state departments. "Alcan" may not be euphonious to the ears of a diplomat, but it has earned a permanent place for itself in American and Canadian military history.

Further Shipbuilding Progress

USE OF PREASSEMBLIES for ship construction is far from new, but many of the sections used at a shipyard described in this issue are fabricated and assembled by other plants and shipped to the yard by rail. Although the size of such assemblies is limited by rail clearances, the scheme has the advantage of reducing the shop capacity and housing facilities required at the water side. By this method, existing fabrication facilities, tools, plant and organization can be utilized wherever found. Thus the scheme reduces the lost time of moving workers from one job to another, and minimizes the growth of boom towns. In addition, relocation of family units with attendant changes in shopping and school requirements are avoided. Only a few new scheduling problems are introduced by the method, hence it is worthy of consideration by all concerned with the building of new shipyards.

Save Your Heavy Duty Tires

CONSTRUCTION EQUIPMENT OWNERS and operators should note that despite the optimistic predictions of some high government officials, there are no new heavy duty tires in sight for trucks or construction equipment for at least several months to come. Hence it is imperative that every effort be made to conserve, protect and repair the rubber tires now on hand. Natural rubber is so short that none of it can be allocated to any tire manufacture and no all-synthetic heavy-duty tires or all-synthetic tubes of any kind have ever been made. Capacity now being completed for production of synthetic rubber is in excess of our normal civilian requirements, but tire making machines and personnel have been converted to direct war production so that less than half this normal capacity is available. Also, synthetic rubber requires many more hours for processing than do the natural materials. Recapping materials will continue to be available and should be used, but tires on construction can best be saved by better road maintenance, personal interest of the top executives and by an example of careful conservation rather than the usual "cowboy" driving that characterizes many supervisors assigned a job car.

New Word Needed

IN WOOD CONSTRUCTION, especially on large jobs where many duplicate pieces are used, it has become the custom to do much preliminary work in a plant or shop. This practice probably will continue because it saves in cost and in "bottleneck" time on the job. At first, the shop merely "pre-cut" pieces to exact length. Now pieces are bored, dapped, notched, grooved for ring connectors and, in fact, are turned out as manufactured products almost to the point where the structure is shipped "knocked-down." With this increase in advance work has come misuse of the term "prefabrication" to denote work done at a plant on single pieces. But prefabrication, by accepted usage, has meant and should continue to convey the idea of assembly and putting together of two or more pieces—operations that are done prior to hoisting into place a portion of a truss, wall or arch rib. The old term "precutting" is hardly adequate. What we need is a term definitely describing operations done on a single piece in a modern plant for processing timber. Among suggestions that have been made are preforming, processing and prefitting. A still better term might be preframing. Suggestion of a word that exactly fits would be a real service.

Chicago's Drinking Water

CONTAMINATION of Chicago's South Side water supply has reached such proportions according to the city's sanitary authorities that only quick action by the federal government in authorizing increased diversions from Lake Michigan will remove the threat of a serious epidemic of water-borne diseases to more than a million of the city's residents.

Untreated domestic sewage and industrial wastes from the Calumet region normally are discharged into the Calumet River and washed down into the Illinois River by the diversion of water from Lake Michigan. During heavy rains, however, the level of Calumet Lake rises, thus reversing the flow of Calumet River, which results in the discharge of these wastes into Lake Michigan where southerly winds often blow them up to the water intakes that supply the city's South Side. The resulting pollution is in excess of what can be treated satisfactorily by simple chlorination, the city authorities assert.

Meanwhile the city's great new South Side water purification plant stands idle due to lack of critical materials to complete it. To offset the lack of this plant, the city has appealed to the War Department and to Congress for authority to increase the diversion of water from Lake Michigan for flushing purposes from the 1,500 cfs. set by the U. S. Supreme Court to 5,000 cfs. The city officials point to the fact that the level of Lake Michigan is higher than it has been for over ten years, hence the increase could be made without detrimental effects being evident for a long time.

This appeal would carry more weight if orders had been issued to boil all drinking water in the affected areas. Chicago has never been fully reconciled to the order limiting its diversions from Lake Superior, yet without that order it would not be where it is today in cleaning up its rivers. Without doubt the city should be given authority temporarily to divert enough water from Lake Michigan to prevent further pollution of that lake from the Calumet River, but only until such time as the South Side purification plant can be completed. Chicago's engineers have done a notable job in attacking the city's sanitary problems the right way—by building water purification plants and sewage disposal facilities. The present emergency should not be permitted to open the door to stopping that progress by giving the city authority to flush its wastes down the Calumet River with Lake Michigan water for an indefinite period.

Is It Essential to the War Effort?

WORK NOW IN PROGRESS on the Inter-American Highway is described in a series of articles beginning in this issue. It is a record of application of American engineering and construction skill in meeting difficult and sometimes almost insurmountable obstacles that speaks for itself. But it also is a surprisingly anomolous record of men working against great odds while handicapped by a lack of transportation facilities and construction equipment that raises the question: Why are these men compelled to continue to work under such conditions if the highway still is as essential to the war effort as the nation was led to believe when the work was first undertaken?

Work on the highway was inaugurated when submarines operating off our coasts were taking a heavy toll of our ships and were threatening our communications with the Panama Canal. Today, that situation is radically changed for the better.

We are told that construction men and equipment are badly needed in the European Theatre of Operations as part of our expanding invasion forces. Meanwhile, some very able army engineers and a considerable number of skilled construction men are being kept in Central America to complete a highway that no longer appears to be essential to winning the war. With their experience, these roadbuilders would form the neucleus of skilled general service regiments for duty in Europe.

Has not the time come for the Administration to reconsider the advisability of continuing work on the Inter-American Highway? It may be desirable as part of our Good Neighbor Policy, but does that outweigh the resulting loss to our fighting forces? In the postwar adjustment period, will the highway not be just as desirable in promoting the Good Neighbor Policy? These are questions that should be faced with an open mind. If the highway is needed, then it should be attacked in the way the Alaska Highway was attacked, completing it quickly and freeing the men and machines for service elsewhere. If it is not needed as part of our war effort, then the work should be stopped and the builders should be assigned to work where their abilities will be of more direct help to our war effort.

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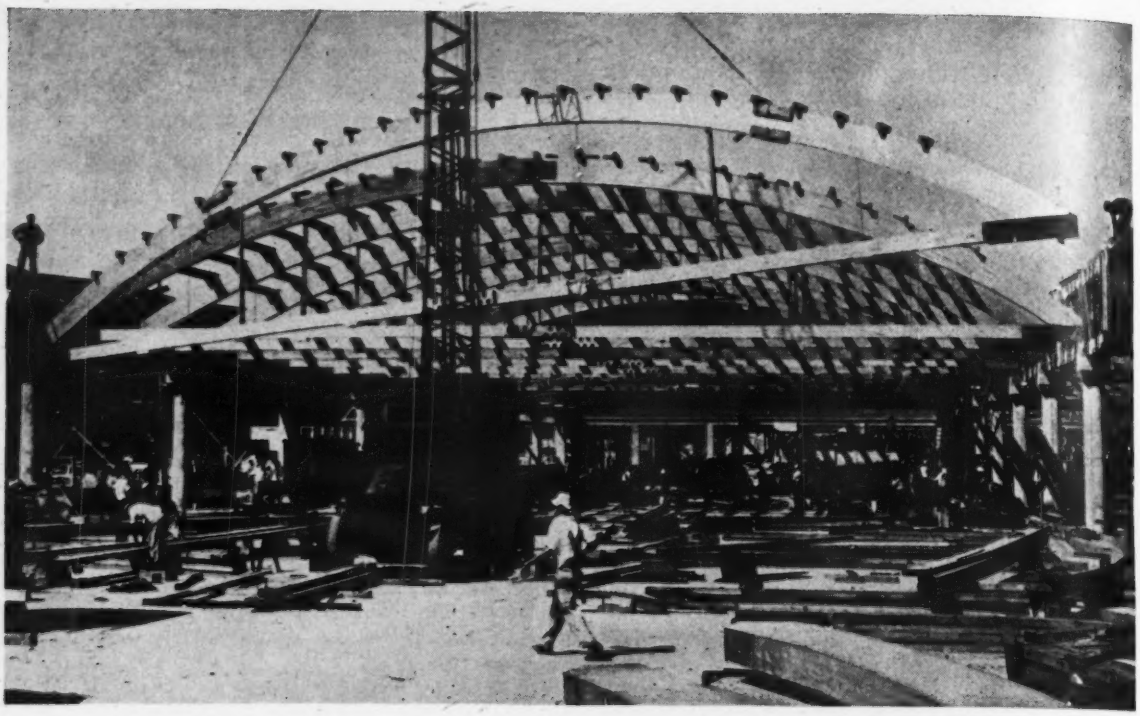


Fig. 1. Roof arches of 100-ft. span provide unobstructed working space in an airplane factory addition.

Heavy Timber Trusses Carry Timber Arches

Alfred Zweig

Structural Engineer, Albert Kahn Associated Architects & Engineers, Inc.
Detroit, Mich.

***Contents in Brief**—Heavy timber construction was required in 40-ft. span trusses that carry end-reactions of 100-ft. span, three-hinged roof arches in a recently completed addition to an airplane factory. Concrete columns of unusual shape support the trusses and alternate arches. Prefabrication of timber arches permitted speedy erection. A two-story office building utilizes timber girders made of plywood webs and laminated chord sections to carry the floor and roof. Special column brackets provide a rigid connection between column and girder.*

AN INTERESTING EXAMPLE of heavy timber construction as a substitute for steel is a plant addition recently completed for the Ranger Aircraft Engine Division of Fairchild Engine & Airplane Corp. Several building units made up the project, but most significant are the factory addition in which 40-ft. span timber trusses support the ends of 100-ft. span laminated timber arches, and the office addition in which the floor and roof are carried on 40-ft. span plywood girders. Both buildings utilize concrete columns; those in the factory being of quite unusual form.

Requirements for the new factory building included a roof with 100x40-ft. column spacing. The roof is carried on 100-ft. span, 3-hinged arches spaced approximately 20 ft. apart, and supported alternately on columns and on 40-ft. span timber trusses. The addition includes two of these 100-ft. aisles.

The arches, of 16-ft. rise, include a rib 9½x26 in. and a bottom tie of two 3x13-in. pieces, carried from the rib by ⅝-in. steel hanger rods spaced about 11 ft. apart. Both tie and rib are spliced at the center of the span. Wooden splice plates and timber connectors were installed in sufficient numbers to develop the full strength of the tie, whereas the rib sections were butted together and held laterally by two ⅜-in. steel plates and five ¾-in. bolts on each side of the splice. The shoe at the spring line of the arch, connecting rib and tie, is a welded assembly of two ⅝-in. lateral steel straps, one ⅜-in. bottom plate, and one ¾-in. vertical plate, stiffened by three horizontal diaphragms. Stresses in the rib are transferred into the tie by butting the top chord against the vertical ¾-in. plate and connecting the tie to the lateral steel straps with shear plates and ¾-in. bolts.

The arches were designed for dead load in combination with either a full live load of 30 pst., uniformly distributed, or half the live load, unbalanced on one side of the arch. In addition, a concentrated load of 10,000 lb. at any one point was provided for in the design.

Both rib and tie are of glued laminated construction, made up of 1-in. planking and designed for an allowable fiber stress of 2,000 psi. in combined bending and compression. Arches were prefabricated and shipped to the site in four sections (two rib pieces and two tie pieces). They were assembled on the ground and erected as a unit by a truck crane using a two-point pickup.

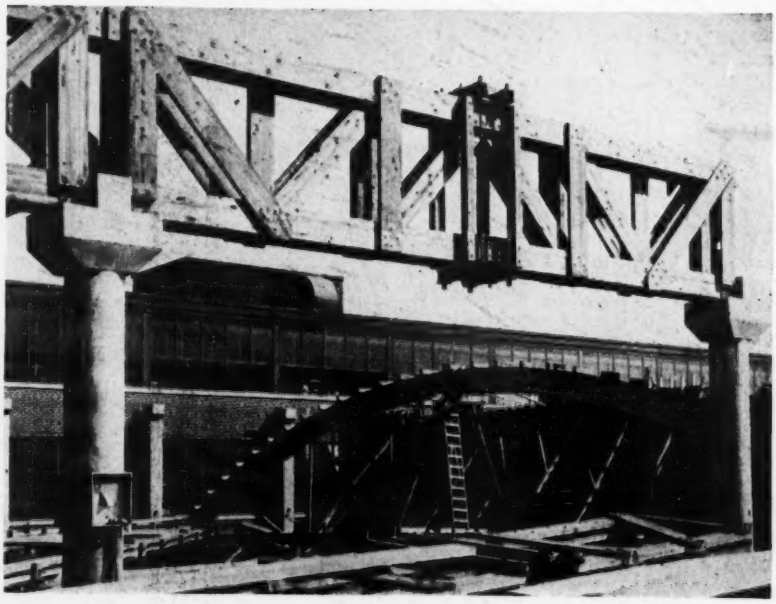


Fig. 2. Reinforced concrete columns carry 40-ft. timber trusses which, in turn, support alternate timber roof arches of 100-ft. span. Half of the arches are supported directly on the caps of the columns.

Arch-supporting trusses

To support the roof arches located midway between columns, parallel-chord carrying-trusses span 40 ft. between concrete columns. These trusses, 7 ft. deep, back to back of chords, are designed for a total chord stress of 185,000 lb. and a maximum diagonal stress of 90,000 lb., resulting from the 120,000 lb. concentrated end reaction of two abutting roof arches. To withstand such stresses, the top-chord was made of four 3x13-in. planks and the bottom chord of four 3x14-in. pieces, with diagonals and verticals made up of two or three pieces of 3x13-in. boards inserted between the chord members. All joints were fastened with 4-in. split-ring connectors.

Reactions from the roof arch, though applied at bottom chord level, are transferred through a steel saddle to the top chord only, as shown in Fig. 3. The steel shoe of the arch does not rest on the bottom chord but is supported by the saddle, built up of short pieces of 12-in. channels which, in turn, rest on 6-in. cross channels. These cross-channels are supported by four 1½-in. and two 1-in. rods attached to two pairs of 6-in. channels resting on two 1x14-in. steel plates placed on top of the top chord.

Along the exposed side of the building only one set of arches, for

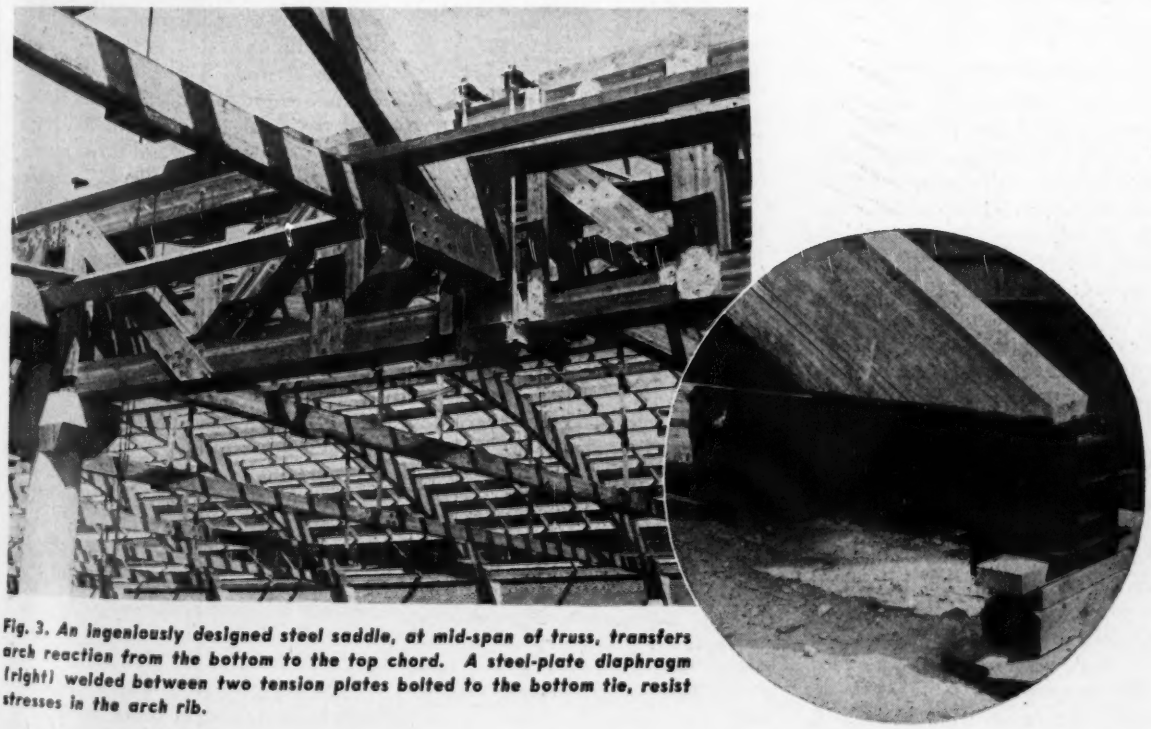


Fig. 3. An ingeniously designed steel saddle, at mid-span of truss, transfers arch reaction from the bottom to the top chord. A steel-plate diaphragm (right) welded between two tension plates bolted to the bottom tie, resist stresses in the arch rib.

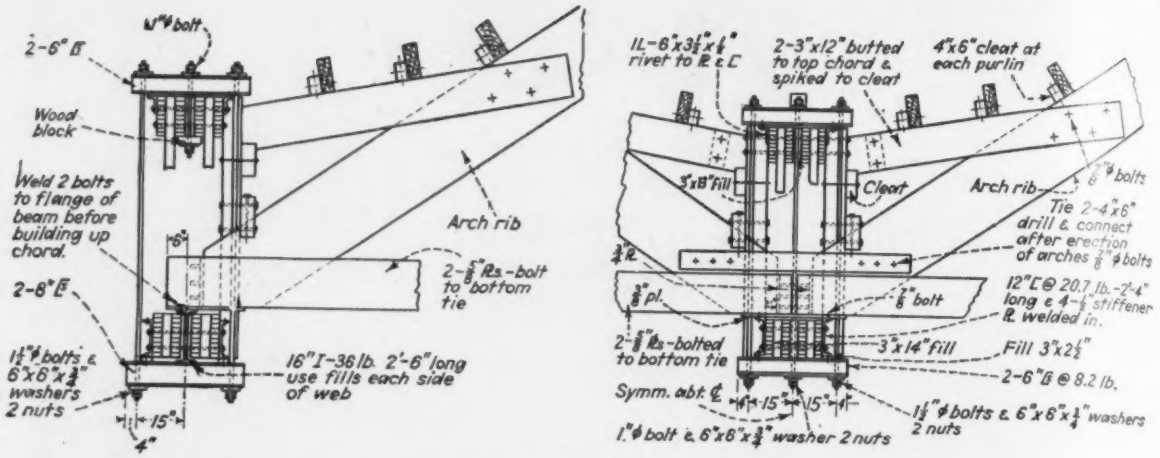

2-6"[B
Wood block
Weld 2 bolts to flange of beam before building up chord.
2-8"[B
1½"ϕ bolts c. 6"x6"x¼" washers 2 nuts
15"
4"
Arch rib
2-⅞"ϕ Rs.-bolt to bottom tie
16"I-36 lb. 2'-6" long use fills each side of web
1L-6"x3½"x½" rivet to R. c. C
2-3"x12" butted to top chord & spiked to cleat
4"x6" cleat at each purlin
3"x8" fill
Cleat
Arch rib
⅞"ϕ bolts
Tie 2-4"x6" drill & connect after erection of arches ⅞"ϕ bolts
¾ R.
⅜" pl.
⅞" bolt
12"[@ 20.7 lb. -2'-4" long c 4-½" stiffener R. welded in.
2-⅞"ϕ Rs.-bolted to bottom tie
3"x14" fill
Fill 3"x2½"
2-6"[@ 8.2 lb.
Symm. abt. ℄
15"
15"
1½"ϕ bolts c. 6"x6"x¼" washers 2 nuts
1"ϕ bolt c. 6"x6"x¾" washer 2 nuts

Fig. 4. To prevent torsion on the outside carrying-truss, caused by a one-sided arch reaction, the shoe plate was extended 6-in. and a short I-beam placed on center line of truss as shown above. At the interior truss (right) the purlins between arches are carried on 3x12-in. timbers.

the time being, are supported by the carrying-trusses. To prevent a one-sided load application of 60,000 lb. from twisting the truss, the steel shoe of the arch at this end was extended 6 in. to rest on a short 16-in. I-beam inserted between the center pieces of the bottom chord.

Kiln-dried lumber was used throughout the carrying-trusses with the following allowable design stresses: 1,600 psi. in tension; 1,466 psi. compression parallel to the grain; and 2,000 psi. in bending. The trusses were prefabricated in the factory and shipped as a unit to the site.

Unusual concrete columns

Concrete columns of unusual shape were used in the factory addition. In the center wall and exposed side wall, round columns with square capitals were formed in place, whereas columns along the existing building are rectangular in section with a bracket at the top to receive the timber arches. The cylindrical columns were formed with standard metal forms, thus saving time and reducing costs. Column capitals were designed to receive two carrying-trusses and two arches at their proper levels; the bottom of the arch tie being 16 ft. above finished floor.

The factory roof is composed of 3-in. precast, light-weight concrete slabs supported on 4x12-in. purlins spaced 40 in. c. to c. Side walls are of brick construction incorporating 8½-ft. high window sash.

The two-story office building required continuous window sash in brick spandrel walls, which had to be supported by reinforced concrete spandrel beams. This heavy wall is carried on reinforced concrete columns poured monolithic with the spandrel beams. Columns are spaced 20 ft. apart along the walls and support built-up plywood girders of 40-ft. span that carry the wooden floor and roof joists. Floor joists are 8x12-in. timbers, spaced 40 in. c. to c., to carry a 2-in. wood subfloor and a ⅞-in. finished floor, designed for a 75-psf. live load. The office building roof is of the same construction as that used for the roof on the factory addition.

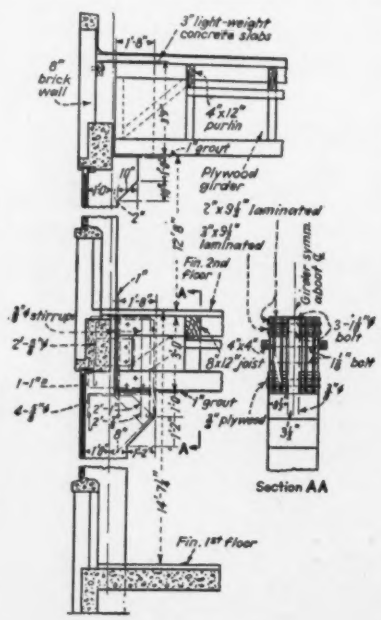


Fig. 5. Twin girders at each concrete column carry 4x12-in. floor joists that support the second floor of the office building. Substantially reinforced column brackets provide rigidity for the girders. Single plywood girders carry a 3-in. light-weight, precast concrete roof.

Plywood girders carry floor

Two 40-ft. span plywood girders were provided at each column to carry the floor. Each of these twin girders consists of two ¾-in. plywood webs with top and bottom chord sections containing three laminated members each, built up of 2-in. strips and glued to the plywood webs. One member of each chord is built up to 3x9¼ in. and the other two measure 2x9¼ in. each. The two webs and three chord members made it possible to increase the glue surface to such an extent that the entire horizontal shear between webs and chords, at the support, was taken by the glue only without requiring nails or bolts.

Vertical 3x8-in. stiffeners, spaced 40 in. apart, were placed between the webs at each floor joist. Webs were spliced at stiffeners and splices were staggered so that only one web was spliced at any one point. The plywood was glued to the stiffeners, and in addition, forty 12d. nails were used each side of the splice. A 3x8-in. diagonal stiffener also was provided between the webs at the supports. An allowable design shear stress of 350 psi. was used for the plywood.

The girders rest on a concrete column-bracket, and in order to secure

a rigid connection between column and girder, the following provisions were made: Special anchor bars were embedded in the column and extended down into the bracket. The twin plywood girders were erected on both sides of these anchor bars, leaving a 7 in. space between them. Three 1⅛-in. bolts were placed in the top and bottom chords and carried through the looped anchor bars. Concrete was then poured in the 7 in. opening between girders, thus providing a rigid corner connection.

Timber erection finished in two weeks

Erection of the complete timber construction took only about two weeks, as the arches were fabricated and shipped at the rate of seven per day. Brown & Matthews were the general contractors. All timber construction was fabricated by Unit Structures in Peshtigo, Wis. The Ranger Aircraft Engines Division of Fairchild Engine & Airplane Corp. was represented by W. E. Myott. Plans and specifications for these buildings were prepared by Albert Kahn Associated Architects and Engineers, Inc., Detroit.

Fig. 6. Plywood girders, supporting the second floor and roof of the office building, are rigidly connected to cast-in-place concrete columns. Concrete beams support brick spandrel walls containing steel sash.

Indiana Highway Bridges Designed To Carry Two Lanes of 40-Ton Trucks

Incorporating the most progressive methods of design, these Indiana state highway bridges are capable of carrying two lanes of 40-ton trucks. Completed last year over White River (left) and Fall Creek (right), the structures are on Indiana State Highway 534 now used as an access road to Fort Benjamin Harrison and intended, after the war, to bypass traffic around Indianapolis to the south and east.

Additional strength was provided in the structures by designing them for an H-20 loading, with impact and live-load distribution calculated according to the 1941 A.A.S.H.O. specifications, with the provision that whenever the live load and impact stress in a member exceeds stress due to dead load only, the live load is doubled (H-40) and the member is designed for a unit stress 50 percent greater than allowed for H-20 loading; thus providing for emergency 40-ton truck loads without exceeding the elastic limit of the structures. Additional calculations indicate a 90-ton load carried on caterpillar treads similar to those of the heavy army tanks can be moved safely across the structures provided such a load is properly routed and proceeds slow enough to eliminate all effects of impact.

Both structures have a 28-ft. clear roadway with 2-ft. sidewalks on the truss spans and 2½-ft. sidewalks for the arch bridge. The steel bridge has two 9-ft. and two 174-ft. truss spans, while the other bridge includes two 40-ft. and three 80-ft. filled, spandrel arches built on a concave, or depressed vertical curve.

Contract for the truss spans was held by the B. E. Curry Building Corp., Bloomington, Ind. and the arch structure was constructed by Smith and Johnson Contractors of Indianapolis. Designs were prepared by the State Highway Commission of Indiana.

These bridges are designed to carry 90-ton caterpillar tread army trucks if moved slowly to avoid effect of impact.

Concentric-Ring Concrete Tank For Topeka

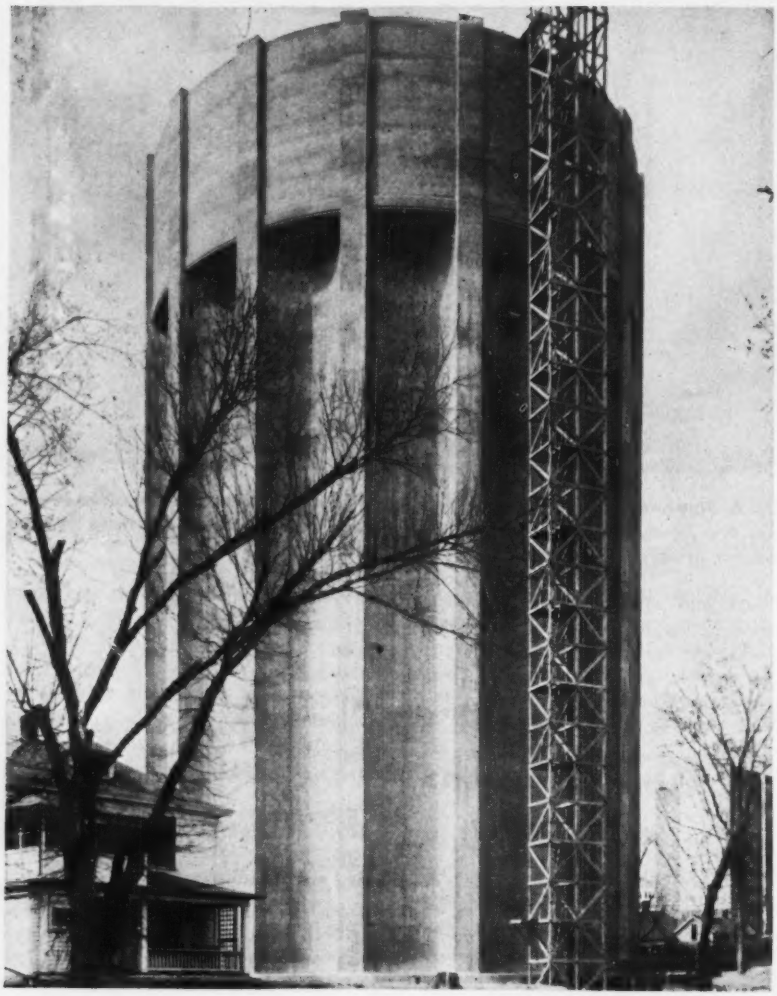


Fig. 1. One million gallons of water storage at Topeka, Kan. is provided by a reinforced concrete tank on a concrete "tower" of concentric walls, the outer one of which is fluted to give a distinctive appearance.

***Contents in Brief**—Water supply for a nearby airbase required additional elevated storage for the Topeka, Kan., water system. Limitations on construction materials available and a demand for pleasing architectural appearance resulted in a concrete tank with fluted exterior surface. The structure contains a 1,000,000-gal. tank 120 ft. above the ground, supported on three concentric concrete rings inside the fluted exterior wall, and has a second 1,000,000-gal. tank in the base of the structure, below the ground. Walls were built with sliding forms, a work platform on the rising structure serving as the supporting form for horizontal slabs for tank bottom or cover.*

MEETING THE OBJECTION of homeowners to erection of an elevated storage tank in a residential area, Topeka, Kan., has an attractive concrete structure that is far from the eyesore that many residents had feared. Exterior of the supporting structure is a distinctive fluted surface that is accented by pilasters. Also, Topeka citizens can take much satisfaction from the fact that the reinforced concrete design made the most economical use of critical war materials that was possible in a facility of this kind.

The tank is of the so-called concentric ring type in which the "tower" consists of a series of concentric concrete walls instead of the more usual columns and bracing. The tank itself, a concrete cylinder 87 ft. in diameter and 25 ft. high, with a capacity of 1,000,000 gal., rests on top of these concentric walls. Rings of columns within the tank and directly over the walls carry the tank roof framing.

1,000,000 gal. tank in basement

An unusual feature of the installation is a "basement" tank, also of 1,000,000-gal. capacity, which was made possible when excavation for the foundations had to go down about 30 ft. below ground level to reach rock. Although not originally contemplated, and necessarily subject to pumping to be usable, this additional water storage is very welcome; the prime reason for the tank is to aid the city in supplying a nearby airbase, and the requirements of such war jobs often outrun original estimates.

Ordinarily such a tank and tower would resemble an up-ended cylinder, with smooth exterior surface, but as a concession to those who objected to any kind of a tank in this location, some means was sought to improve its appearance. The consulting architect, after some study, suggested a fluted surface for the exterior ring of the tower. Such a scheme was finally adopted, and while it increased the cost of construction somewhat, it provided a structure that met with general approval throughout the city, as well as one that furnished some unusual problems not only in design but in construction, particularly with respect to the use of sliding forms.

Concentric walls support tank

As shown in the accompanying drawing, the foundation tank is composed of three inner concentric rings of 8-in. walls and an outside wall of 18 in. thickness, all of which rise 24 ft. from the foundation slab to ground level and over which is placed a heavy slab forming the roof of the underground tank and also the support for the tower walls. From

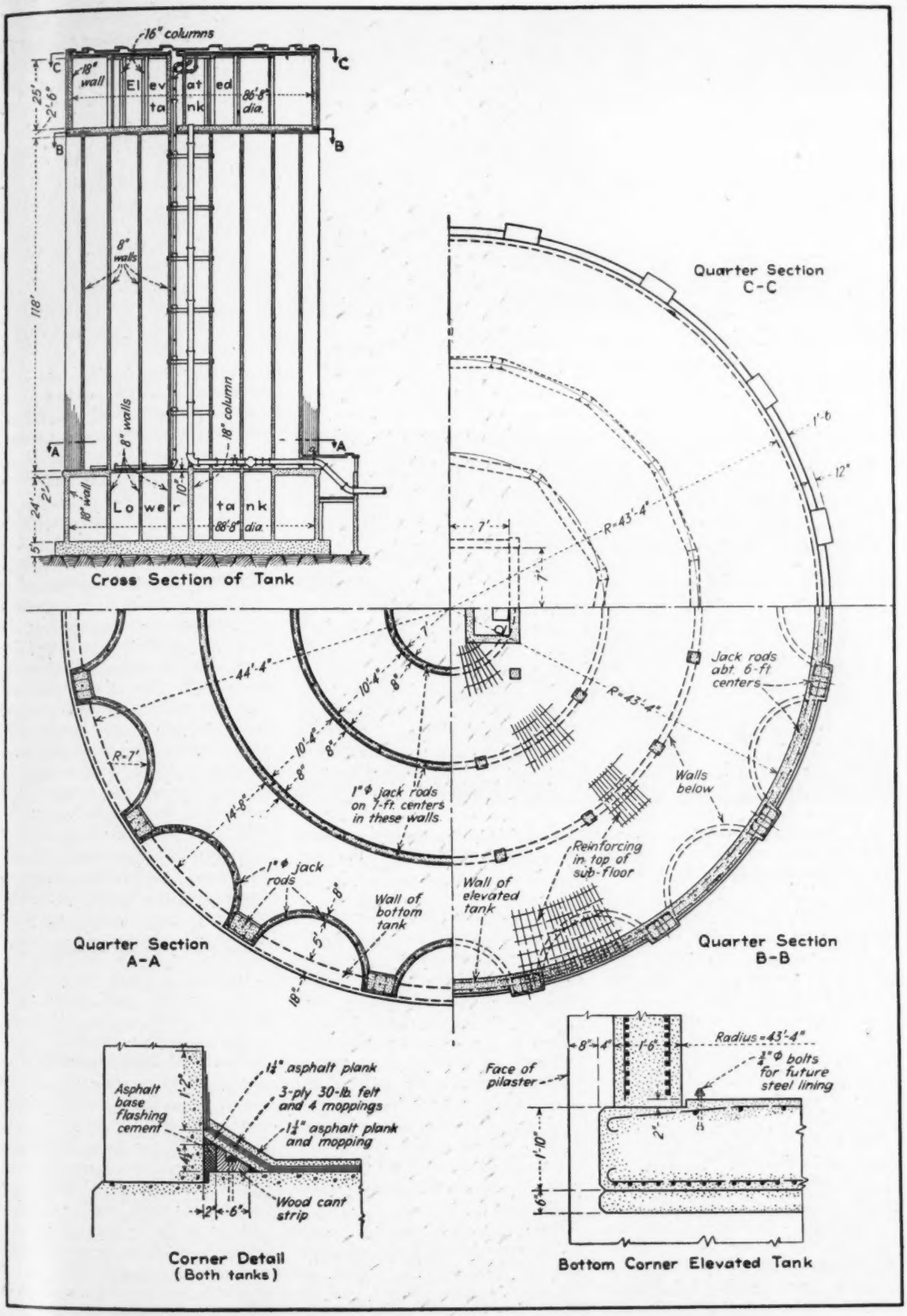


Fig. 2. Structural design details of concrete elevated water tank at Topeka, Kan. Concentric concrete walls support the tank 120 ft. above the ground and on top of another tank accommodated in the foundation space.

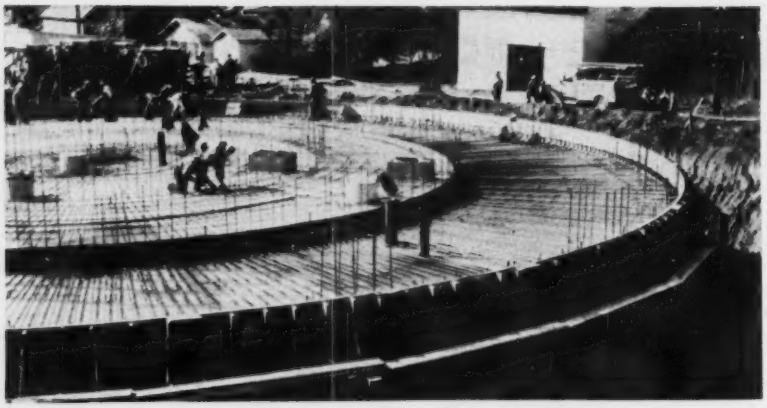


Fig. 3. Installing steel for slab over the ground storage tank. Dropped portion in outer annular ring provides for thickened slab to support the fluted exterior wall of the tower.

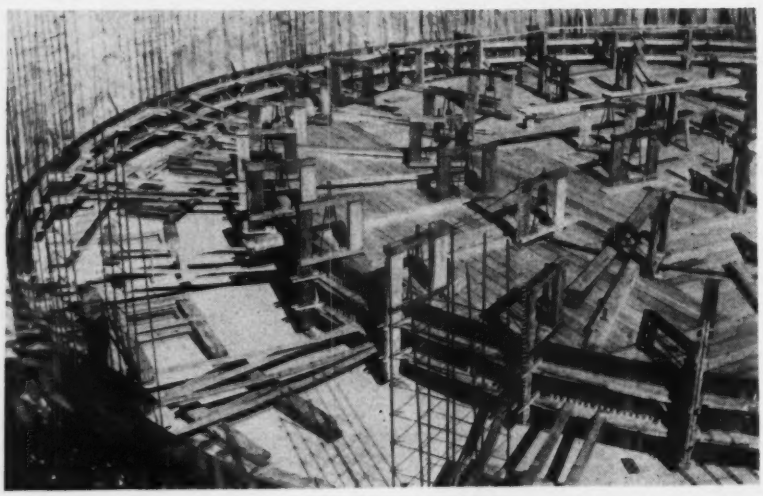


Fig. 4. Assembling the sliding forms on the foundation slab preparatory to constructing the concentric walls. The working platform at the top of the forms has not yet been installed in the outer ring.

ground level to the bottom of the elevated tank, these tower walls, 120 ft. in height, consist of three concentric 8-in. ring walls and an outer ring wall of fluted form also 8 in. thick, but strengthened by pilasters. This outer wall lends an effect of shades and shadows when observed by day or by night when floodlights, one in each of the flute formations, are turned on.

The inside circle of the tower accommodates the riser, overflow and roof drain pipes, so that none of this piping is exposed on the outside of the structure. The 24-in. cast iron riser pipe is carried on an 18-in. square column resting on the foundation slab, and in addition is supported at about 20 ft. intervals by timber struts spanning across the center circle.

The most economical way to support the concentric walls was to provide a continuous flat slab resting on rock. This slab was made about 5 ft. thick, and to it the concentric walls were doweled with $\frac{5}{8}$-in. diameter rods 6 ft. 6 in. long. Another slab, as stated, was required at the ground surface to support the walls of the tower. Over most of its area it is 10 in. thick but since the curved portions of the outer wall extend back into the space between the two outer walls the slab in this annular space is increased to 24 in.

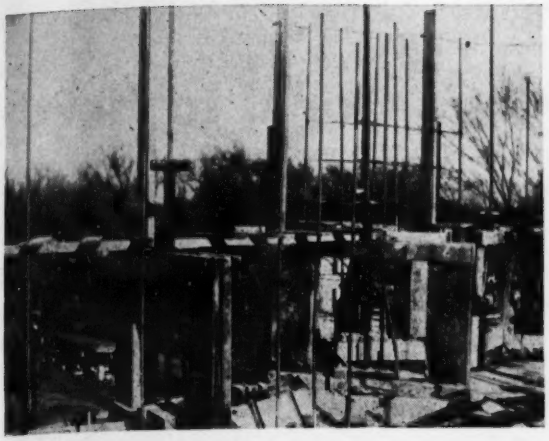
Reinforcing in the concentric walls, which carry vertical loads only, consists of two lines of $\frac{5}{8}$-in. vertical bars staggered on 12-in. centers, plus two lines of $\frac{1}{2}$-in. circumferential bars also at 12-in. centers. Reinforcing in the pilasters of the exterior wall consists of eight $\frac{3}{4}$-in. vertical bars and horizontal ties of $\frac{1}{4}$-in. bars spaced 12 in. on centers. A heavier concentration of steel also is required in the outer walls of the tanks. Here the vertical bars are likewise $\frac{5}{8}$-in. diam. on 12-in. centers staggered, but the circumferential rods vary from 1 in. square on 3-in. centers near the bottom of the wall to $\frac{3}{8}$-in. diam. on 8-in. centers near the top.

In addition to the structural reinforcing, 1-in. diameter jack rods, used in operating the sliding forms during construction, were spaced 7 ft. apart in the three interior walls and 6 ft. apart in the exterior walls.

To avoid some of the dead weight to be raised by the jacks, the forms for the floor slab of the elevated tank, which were assembled at ground level, were kept as light as possible, and to this end were built to support only a 6-in. concrete slab. This slab was allowed to set before constructing upon it the main slab of 24-in. thickness. This scheme was an important consideration in the design of the structure and materially reduced the weight carried by the jack rods. The first 6-in. subfloor was poured integral with the tower walls and reinforced with $\frac{5}{8}$-in. diam. radial rods and $\frac{1}{2}$-in. diam. circumferential rods top and bottom; the bottom radial rods were continuous while those in the top were in short lengths and located over the concentric walls of the tower. On this subfloor the 2-ft. thick tank bottom with a similar arrangement of reinforcing, but using $\frac{3}{4}$-in. diam. rods both top and bottom, could then readily be formed and poured.

Materials used for watertight tank

Unusual care was exercised to secure watertight tanks. Flint aggregate had been used for the concrete in the supporting structure, but for the tanks limestone aggregate was substituted to increase strength and density. Also lower working stresses were used—0.35 f_c' in the concrete and 8,000 lb. per sq.in. in the steel. As further means of securing watertightness, the surface of the floor of the elevated tank was treated first with an asphaltic base primer coat followed by three layers of 30-lb. roofing felt mopped with asphalt. Over this was laid a complete covering and protection in the form of a layer of $1\frac{1}{4}$-in. premoulded asphalt plank, set in plastic cement. The sur-



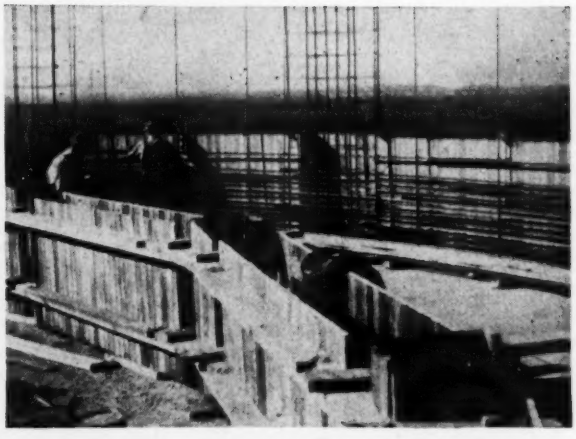


Fig. 5. Closeup of jack frames in exterior wall. Each curved section of this wall was raised as a unit with three jacks. Right: With tower completed, reinforcing is being installed in wall of elevated tank. In the foreground are forms for the columns and beams that support tank roof. The beam forms, which support a working platform over which concrete is buggied, are progressively raised as the columns are poured; when they reach the roof the beam forms are also filled.

face of the plank finally was covered by a "squeegee" application of hot asphalt cement.

Where the sidewalls join the floors in the tanks, a cant strip of wood was fabricated and imbedded in plastic cement, applied first to the concrete surface and secured to the floor through the use of bolts previously set in the concrete. Over the wood cant strip and at right angles thereto were set short slabs of asphalt plank imbedded in plastic cement and covered with the roofing felt. Finally, a second layer of asphalt plank was applied to join with the plank covering the entire tank floor area. Sealing of the tank wall to the cant strip, the roofing felt, and the asphalt plank was accomplished by a liberal use of plastic cement and a final band strip of cotton fabric applied in three layers against the tank wall and over the cant strip planking. The entire inner surface of the tanks was also painted with a special synthetic-base plastic preparation.

Columns support tank roof

As shown by the accompanying drawing, the concentric walls of the tower are discontinued at the tank level, and rows of square columns on the same circles are substituted to support the tank roof slab. These columns carry rings of roof beams over which the flat slab roof is supported. The pilasters, it will be noted, continue through to above the roof level.

Access to the tank itself is through a manhole in the roof, while another manhole opens into a square shaft which is a continuation through the tank of the central riser compartment of the tower; only through this shaft can the roof be reached. A door at ground level and openings through each of the concentric walls gives access to the base of a ladder hung on the wall of the central compartment.

Sliding forms employed

Most spectacular element of the construction operations related to the use of sliding forms. Because of the four concentric walls, a forest of jack frames was required, and because of the fluted exterior wall some special techniques had to be devised. All walls had to go up at the same rate, of course, so that the working platforms between the walls would all be at the same level.

The forms, in general, followed the usual design for such construction accessories. They were about 4 ft. high, made of 4 in. wide T&G flooring set vertically and stiffened on the outside by two lines of wales. Over the forms were set the U-shaped jack frames in whose top cross members the threaded casting is installed that engages the hollow threaded pipe that is slipped down over and fastened to the jack rods set continuous in the concrete.

In some jack frames lifting force applied to the jack rods through the screws is transmitted to the forms through the legs of the jack frames. Such an arrangement requires that the cross members of the jack frames be designed to resist considerable bending, but on this job this requirement is eliminated by lifting through a steel rod yoke whose top is attached to the cross member close to the lifting screw and whose prongs engage the two sides of the forms.

Jack frames for the three inner walls were set 7 ft. apart and, being at right angles to the walls, were on radial lines to the center of the tank. On the fluted exterior walls, however, such a uniform disposition of the jack frames was not possible. There was a jack frame at each side of each pilaster which was set on a radial line to the center of the tank, but the three jack frames required for each curved section were on the radial lines of its particular curve which converged away from the center of the tank.

Raising the exterior wall forms, therefore, was somewhat different from raising the forms for the other walls; each curved wall section was an operation in itself, as was each pilaster. Except for the greater care that had to be exercised on the exterior walls, however, the sliding forms were progressively raised to the top in ¼-in. lifts for each turn of the jacks. Concrete was raised in an outside elevator tower to the working platforms attached to the forms, and was buggied into place.

The tank was designed by R. A. Finney, consulting engineer, and the consulting architect was T. R. Griest, both of Topeka. The contractor was the Jones-Hettlesater Construction Co. of Kansas City, Mo., for which O. N. Evans was superintendent. W. E. Baldry is city engineer of Topeka, and the job was carried out under his direction.

A Weir with Flow Proportional to Head

Edward Gerald Smith
Hydraulic Engineer, U. S. Engineers, Denison, Texas

IN SEEKING A WEIR for float-regulated chemical dosing of sewage effluent—whereby discharge is proportional to the head above the crest—a weir of the inverted-notch type has proven very practical. It greatly simplifies the dosing procedure by eliminating elaborate float-regulated dosing apparatus or the need to adjust the shape of the weir manually to control the discharge. Use of the weir for this purpose has shown that it should be of great value for many other uses, including its application for maintaining constant velocities through tanks with large variations in flow.

The weir is based upon the formula $Q = 1.57\,C\sqrt{2g}\,WH^{3/2}$, in which Q = discharge in cu.ft. per sec., W = width of notch in ft., H = head above crest of weir in ft., and C = a coefficient that may range from 0.60 to 0.63, depending upon the weir dimensions. It will be seen that to have the discharge proportional to the head over the weir crest, $W\sqrt{H}$ must be constant for any one weir.

To choose a weir for a specific purpose, it is necessary to know only at what head a particular discharge is desired. Knowing this, the widths of the notch for different depths over crest can be computed from the following:

$$Q = 1.57\,C\sqrt{2g}\,WH^{3/2},$$

in which Q and H are known, and C, g, and $W\sqrt{H}$ are constants or

$$W\sqrt{H} = \frac{Q}{1.57\,C\sqrt{2g}\,H} = K$$

Values of K can be computed from known data. For any other depth over the weir crest, $W = \frac{K}{\sqrt{H}}$, which shows that the width varies with the reciprocal of the square root of the head. It should be noted that, if the head is plotted against width on logarithmic paper, the resultant line will be straight with a slope of 1 on ½.

For the relationship just mentioned, a number of curves were plotted on logarithmic paper for constant discharge and variable depth above the crest, the upper extremes of these curves forming straight lines because width is proportional to the reciprocal of the three-halves power of H with those conditions. Based upon the straight line portions of the graphs, the chart in Fig. 1 was prepared. Because of the straight-line relationship of discharge to head in the graph, it will be noted that discharge for a notch of any shape may be obtained by interpolating between lines.

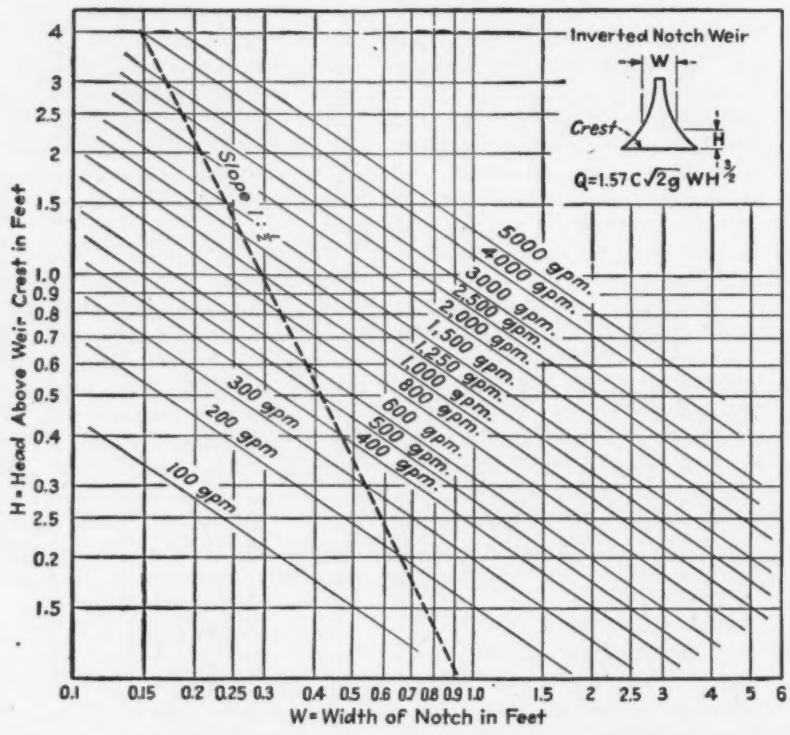


Fig. 1. To obtain desired shape of inverted-notch weir for given discharge and depth above crest, find intersection of desired discharge and assumed head; from this point draw line with slope of 1 on ½ to intersect with horizontal base line, which indicates necessary weir widths at different heads. Shown is line for 4,000-gpm. discharge at 4-ft. head; these conditions would require 0.93-ft. width at 0.1-ft. depth over crest.

In attempting to obtain more information and experimental verification on weirs of this type, the author contacted the U. S. Waterways Experiment Station, Vicksburg, Miss. He was referred to "Sutro Weir Investigations Furnish Discharge Coefficients," by E. Soucek, H. E. Howe and F. T. Mavis, published in *Engineering News-Record*, Nov. 12, 1936, p. 679.

This article provides experimental verification for the accuracy of a similar type of weir. The Sutro weir formula used was:

$$Q = C\,a^{1/2}\,b\sqrt{2g\left(h - \frac{a}{3}\right)}$$

In the Sutro weir, which is shown in Fig. 2, the shape immediately above the crest is rectangular and a and b in the formula represent

depth and width, respectively, of that portion of the weir. Discharge is proportional to head over a datum $\frac{a}{3}$. The curved portion of the weir above the lower rectangle is represented by the relation $x/b = 1 - \frac{2}{\pi} \text{ arc tan } \sqrt{\frac{y}{a}}$

In seven out of eleven of the Sutro weirs tested a equaled 0.02 ft., which is very small. The dimensions of these weirs coincide almost exactly with those for Fig. 1. (Note that the widths on the chart can be adjusted for values of C other than 0.60 by direct proportion.) Inasmuch as the dimensions of weirs obtained from Fig. 1 and those in the aforementioned paper agree very closely when a is small, the paper provides experimental verification of the relationship shown by the chart.

For practical use, discharges relatively higher than those in the experiments will be desired, and the weir sizes obtained from Fig. 1 will be more accurate because of the diminishing effect of end contraction and nappe with increased weir size. This condition is true because contraction and nappe increase arithmetically, and the cross-sectional area geometrically. Since discharge is proportional to C, no great errors are introduced if the coefficient is not exactly correct, as discharge will nevertheless be proportional to head. In all cases the dosage can be adjusted to obtain the desired results.

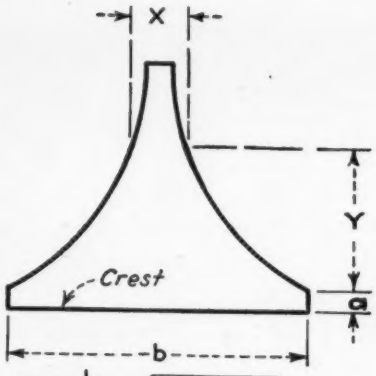


Fig. 2. Outline of Sutro weir, which has flow characteristics similar to inverted-notch weir recommended by author for controlling sewage dosage.

The chart enables an operator to choose a well proportioned weir quickly with three-place accuracy in dimensions. For dosing, a weir will be subject to a rather narrow range of flow fluctuations, never going below a certain minimum discharge. Because of this condition, errors in very low heads are unimportant. Although fine accuracy is not required, for flows of larger magnitude it is desirable to have large changes of head with fluctuations in discharge, which purpose is served most efficiently by this type of weir. At some point where the curve begins to become asymptotic to the weir crest, the notch can be cut vertically, as the small additional opening would carry little discharge.

Labor Urged to Promote Plans for Postwar Construction Projects

Labor has a vital stake in postwar construction, according to Ray C. Kirkpatrick, director of labor relations of the Federal Works Agency, hence it must use its influence to get local public bodies to get plans for such projects into the blueprint stage at an early date.

Speaking before the Texas State Building and Construction Trades Council in Corpus Christi recently, Mr. Kirkpatrick said:

What this means is that we are going to have a tremendous construction job to do after the war. Most people realize the truth of that statement, yet curiously enough—or perhaps not so curiously—very little is being done to get set for that job.

A lot of people have some very fine ideas. They can even show you pretty pictures of the new schools and hospitals and other things that may be built after the war, but very few of them can show you any actual blueprints and working drawings. Except in New York City and a few other places, those blueprints just simply don't exist. The sites haven't been acquired. The legislative approval has not been secured. Just the matter of acquiring land for public works alone often takes months, or even years, especially if it has to be obtained by condemnation proceedings in the courts.

Labor has a more vital stake in this matter of postwar reconstruction than anybody else. It means bread and butter. I think most public officials mean well, but naturally they haven't quite the same interest in it that you have, because they aren't the people who run the risk of having to tramp the streets in a vain search for work. They won't be selling apples on the street corner.

That's why I think they may need a little active persuasion before they will be able to find the money to put the engineers, architects, draftsmen, lawyers and others to work on actual plan preparation.

Many of them are probably holding back to see what Congress is going to do. They want to know *first* whether the federal government intends to help them pay for plan preparation, and probably also help to finance public works construction. I hope that Congress will adopt a policy at the earliest possible moment so that the local communities will know what they can count on.

But at the same time, without waiting too long for Congress to act, I think there is much that the local officials can do. We now know that public works construction is a continuing function of government, and I see no reason why the planning also shouldn't be a continuous function, provided for in municipal, county, state, and federal budgets, just as they now provide for such other necessary activities as milk inspection or education.

I am talking to you as construction trades workers, but I am thinking about much more than your welfare. I am thinking about the welfare of all workers and of the country as a whole. According to the Bureau of Labor Statistics, for every man-hour worked on the site in construction activities, two and a half hours have to be worked off the site in producing, processing or transporting the materials needed. Stated another way, if the construction industry could employ as many as two million men at the site after the war, a total of seven million jobs would result.

Fig. 1. At end of the production line the all-welded ships are side-launched to keep stresses of the vessel at a minimum.

Production Line Shipbuilding With Preassembled Sections

***Contents in Brief**—Naval ships more than 300 ft. long are built on an assembly line using preassembled sections delivered by revolving gantry cranes operating on tracks transverse to the direction the ship travels. As construction advances, the vessels are moved sideways on 4-wheel buggies equipped with hydraulic jacks to lower the ships on permanent blocking at the seven different berths. At the end of the 625-ft assembly line, each vessel is lowered on timber sleds by which it is launched sideways.*

PROFITING from many years experience in building small vessels and steel barges on an assembly line and launching them sideways, the Dravo Corporation, at an inland yard, is building medium-size, ocean-going ships by a similar method. Dravo is one of the first American firms to build ships in this way, the method permitting welding and preassembly to be used to great advantage. As a result, construction of standard all-welded vessels (called Launching Ships for Tanks, which is shortened to LST in naval language), has been economical and rapid.

Among the advantages of the assembly line method using large preassemblies are these: First, the continuous delivery of materials along the same channels offers the advantage of mass-production methods. Equally important, the use of preassemblies permits much of the fabrication work to be done under a roof. Thus, fabrication of preassemblies may not only continue 24 hours a day under good lighting conditions, but bad weather does not halt operations. Preassemblies may also be prepared so that the required welding is accomplished almost 100 percent down hand.

A number of advantages also are offered for sidewise launchings. These include: (1) Assembly berths may be located sufficiently high to be above major floods—an important consideration where yards are located on rivers; (2) assembly on an even keel with access to the full length of the hull is possible; (3) the hull is not subjected to stresses during launching in excess of those during normal operation of the vessel; and (4) no expensive cofferdams are required such as would be needed in constructing outboard launching ways. Since Dravo had built and launched sideways a large variety of small vessels, they were able to safely extend the method to the moderate-size fighting ships.

Assembly on a level area

Layout of the yard is shown in Fig. 2. Many of the buildings existed before construction of the naval ships was begun, major new construction being the ship assembly line shown at the lower right of the drawing. The assembly is done on a level area about 400 by 550 ft. and at an elevation roughly 25 ft. above normal

river level. This elevation resulted in an unusually long launching distance, but placed the yard above record flood stages.

The structural fabricating capacity was not expanded because a considerable number of structural steel fabricating shops were available in the general territory to build preassemblies in box form and of maximum railroad shipping size. These boxes are brought into a storage area near the plant, from which they are delivered as required to the assembly yard.

The structural shop and the old and new mold lofts in the Dravo shipyards were utilized to construct the more difficult preassemblies involving curved work, such as bow and stern ends, which the average structural shop is not prepared to make. This work represents about 20 to 25 percent of the total fabrication required for each ship.

Railway delivers preassemblies

The preassemblies are brought to the assembly area on railroad flat cars and unloaded either on two steel beam platens, where they are joined up into still larger preassemblies, or they may go directly to the shipbuilding berths.

The berths are parallel to the river front and are arranged to permit moving the ship sidewise from one berth to the next as it is built up. Each berth consists of a steel beam grillage about equal in size to the area of the ship. The beams are supported about 4 ft. above the ground on concrete pedestals with spread footings. The latter rest on a well compacted sand and gravel formation with a bearing pressure of 2 to 3 tons per sq. ft.

A group of eight full-revolving, electric-powered cranes on 54-ft. high portal gantries comprise the weight-handling facilities in the yard. They have a capacity of 15 tons at 60-ft. radius, and for heavier lifts are used in groups of two or three. The cranes are of the self-propelled type, traveling the full width of the assembly area and between the berths (Fig. 3). They have 25-ft. wheel bases and operate on rails 20 ft. c. to c. The cranes receive their power through collector arms extending down into a trench containing the power supply trolley wires.

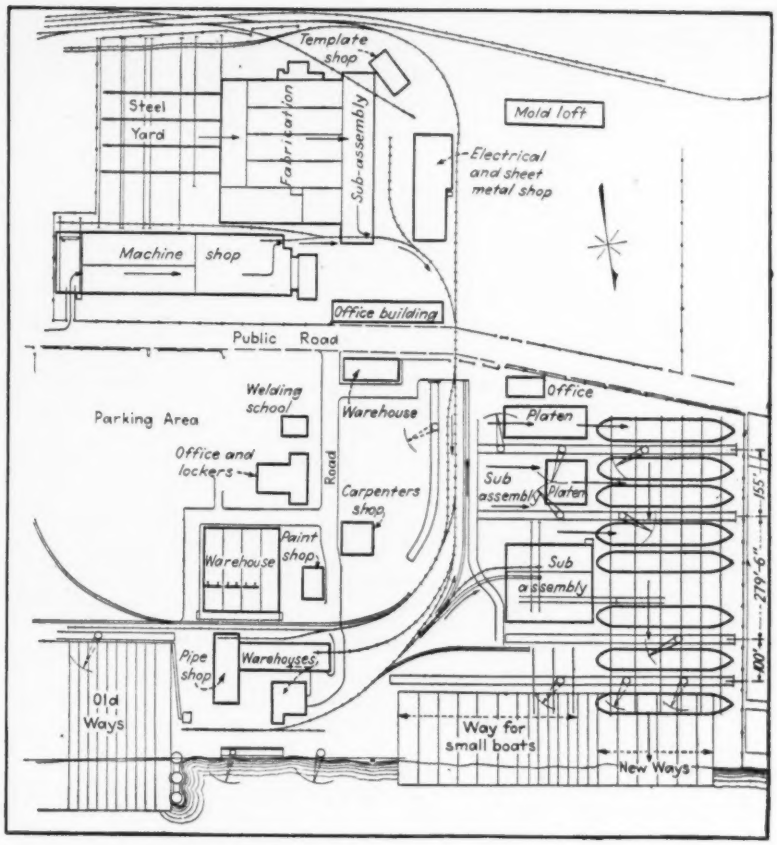


Fig. 2. Seven building positions and the marine ways provide for rapid construction of ships in this compact yard.

Twin cranes place 57-ton stern

Biggest section to go into the ship is the 57-ton stern, which is picked up by two of the 30-ton cranes. Next largest is the 27-ton upper portion of the bow. For other than the bow or stern the heaviest section is 15.5 tons.

All welding, both on the preassemblies and on the assembly line, is done by hand. When sufficient preassemblies have been installed and tack-welded together on the first berth to form a unit, which can be moved by means of the transfer carriages, the ship is transferred to the second berth. At this position additional preassemblies are added, while a new ship is started on the first position (Fig. 3).

When the hull is being moved it clears the steel beams of the berths

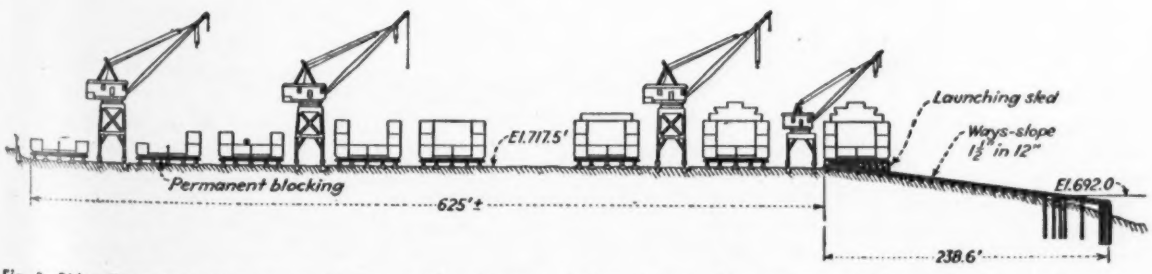


Fig. 3. Ships "grow" as they move riverward through seven stations to launching ways, weighing 1,300 tons at launching.

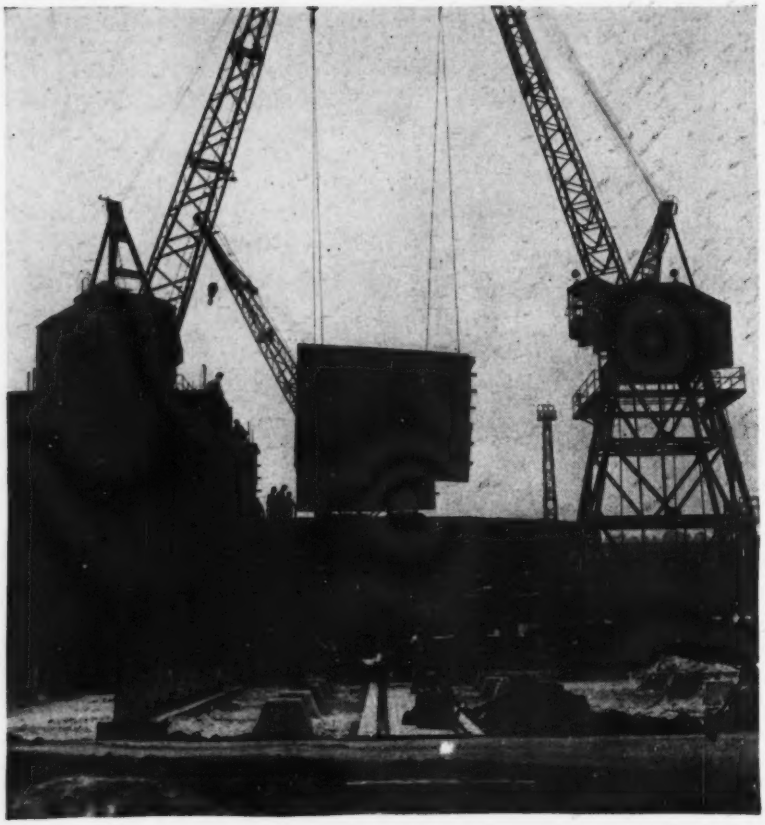


Fig. 4. Two gantry cranes set heavy preassembled section in place at one of the stops along the building ways.

by about 1 in. The heart of the transfer system is a group of four-wheel transfer carriages each carrying four 30-ton hydraulic jacks operated from a single pump (Fig. 5). Each carriage is thus capable of raising and carrying a load of 120 tons. The carriage runs on a special track system and at the next berth position the ship is again lowered on permanent blocking.

Hull moved forward by winches

In moving the hull forward the carriages or buggies move over seven tracks. Generally two, and in some cases three buggies are used on each track, making a total of 16 buggies under the hull. Power to pull the hull forward is supplied by a four-drum car puller or winch designed to pull about 20,000 lb. at 25 ft. per min. and to provide a maximum starting pull of 40,000 lb. Two winches, each operated by a 20-hp. electric motor, are used. The first winch pulls the ship from Berth 1 to 4 and the second from Berth 4 to the launching ways. The hitch to pull the ship forward is a single cable and is made from the winch to the hull and not to the buggies.

Ship moved every seven days

Each ship remains in a given position about one week. It passes through the several stages of tack welding; final welding; compartment testing; partial installation of piping, wiring and outfitting; and installation of miscellaneous deck-house preassemblies. Thus, the ship goes through a conventional assembly line until it arrives at the launching position.

Total weight at the launching berth is 1,300 tons. By the time the ship reaches this point 89,000 lin. ft. of welding has been completed.

Scaffolds move ahead with ship

It is not necessary to remove the scaffolding each time the ship is moved. Instead the scaffolding is hung on the ship and allowed to remain in place until the vessel reaches the final position. In the launching preparations the scaffolding is removed and transferred to the first berth to be used on construction of a new ship.

At the launching position the ship transfer carriages travel out over a group of tilting track beams which are temporarily blocked in a horizontal position (Fig. 6). Next the ship is lowered on six launching sleds, mounted on the groundways, by releasing the hydraulic jacks. After the carriages are rolled out from under the ship, the tilting track beams are lowered at the outboard end so as to clear the moving ship when it is released.

Sleds on 48-ft. centers

The sleds, which are on 48-ft. centers, rest on a coat of grease and are tied to the upper end of the groundways with heavy ropes. The sleds for Ways 1 and 6 are of the same type, and each consists of three 12x12-in. timbers at the top and three 12x14-in. timbers at the bottom with heavy vertical and diagonal bracing in between (Fig. 7). For the other ways, lighter sleds are required, only two timbers being used top and bottom.

The groundways are set on a slope of 1½-in. per ft. and are 235 ft. long. They are supported on stepped concrete slabs in the stable portion of the river bed and on piling at the water's edge. Cofferdams were not required for the construction of the outboard end of the ways. The ways terminate at about water level to rest directly on steel cylinders filled with concrete, which in turn are doweled into the river bottom by piling.

Launching of the ships

Launching of the ship is started by cutting simultaneously the ropes holding the six sleds. Two axmen are stationed at each rope and, at a signal, all swing together to sever the lines.

In going down the ways the ships usually attain a speed of 12 to 15 m.p.h., but striking broadside the speed is quickly dampened.

The outfitting dock is of cellular sheet pile construction with its top located 28 ft. above normal river level. The dock is in two sections. A 1,365-ft. section supports four full-revolving gantry cranes; and another, 300 ft. long, is equipped with one gantry crane. By double berthing, twelve ships can be outfitted at the same time.

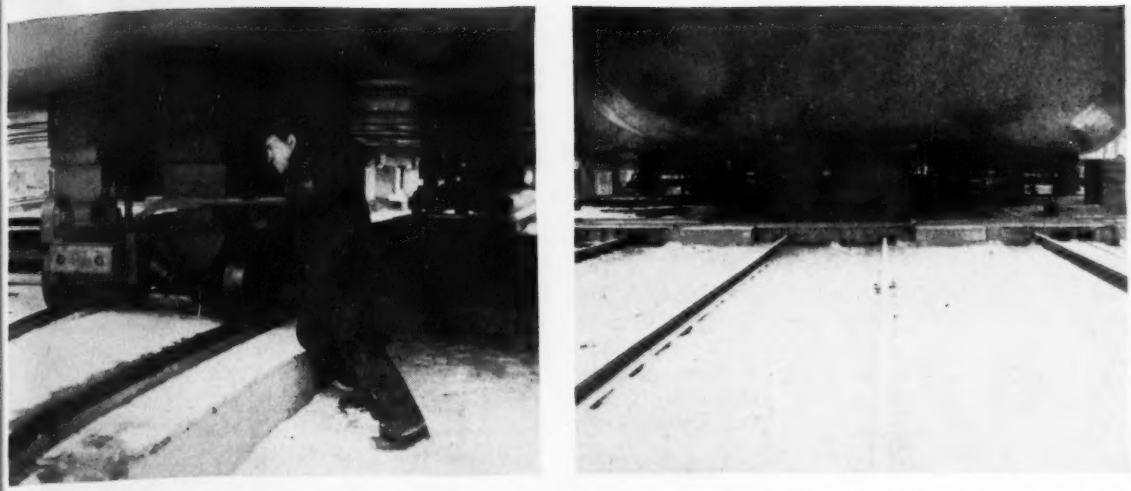


Fig. 5. (Left) Hand-operated hydraulic pump connected to four pistons on carriage raises the ship from blocking for transfer to a new position. (Right) Carriage crosses track on which gantry crane operates.

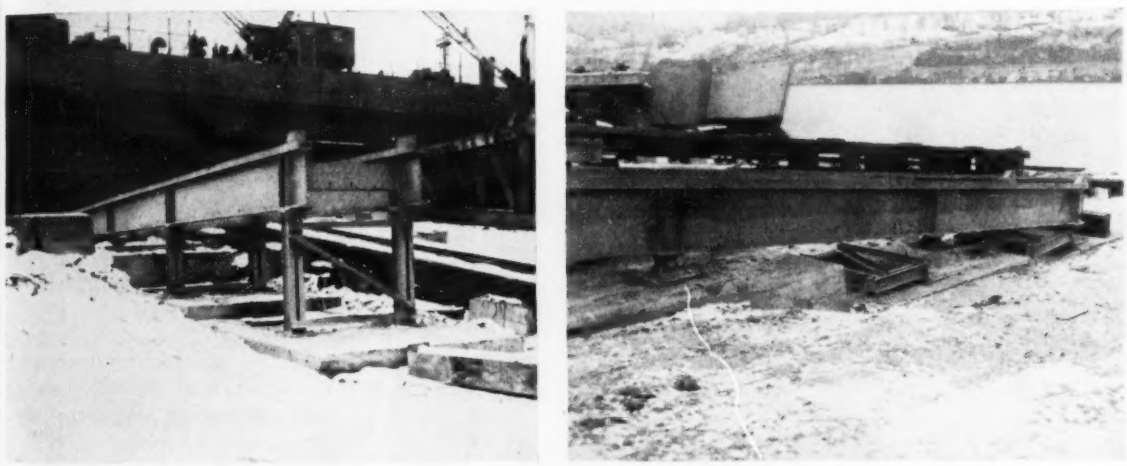


Fig. 6. Rail support for moving ships to launching position is hinged to drop below the line of the ship as the vessel moves down the ways into the water.

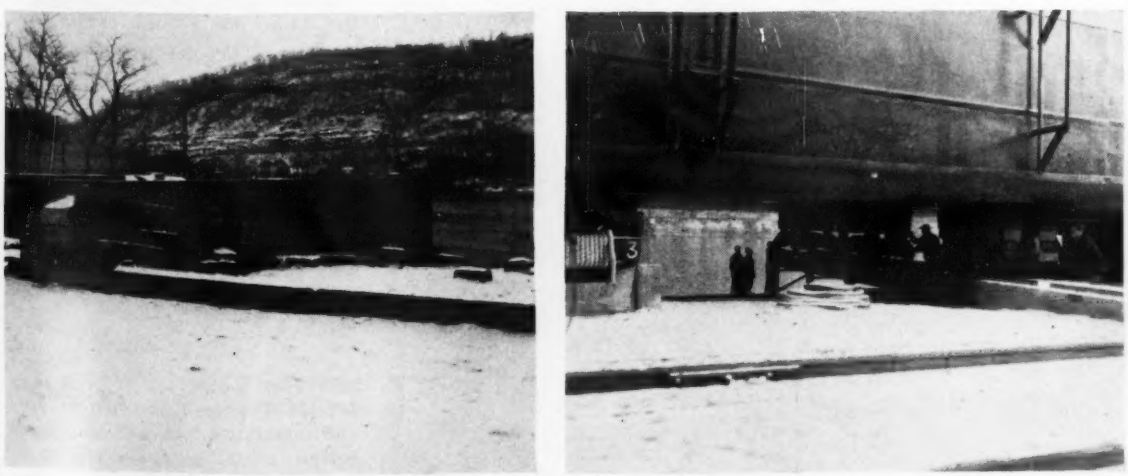


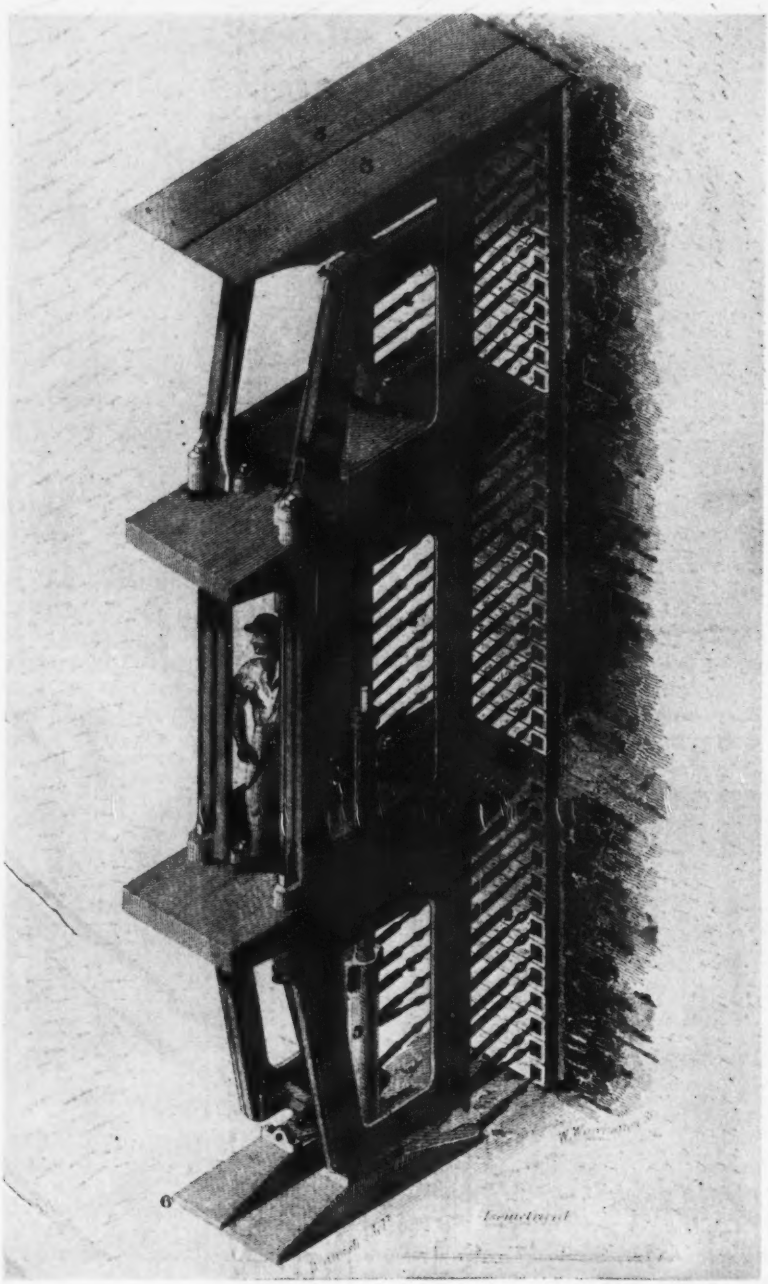
Fig. 7. (Left) Close-up of launching sled and ways. (Right) All-welded ship moving out over sleds to be made ready for launching. That three buggies are used on track shown is to to be noted.

Shield Tunneling 100 Years Ago

H. W. Richardson
Western Editor, Engineering News-Record

Faith, persistence and ingenuity of an engineer who beat down all obstacles and refused to be whipped by previous failures triumphed in completion of the first shield-driven tunnel under the Thames River in London just 100 years ago this spring.

To master the difficulties of subaqueous tunneling, where others had failed, Sir Mark Isambard Brunel, chief engineer for the Thames Tunnel Co., invented the shield and developed the principles of shield tunneling that has made possible the driving of hundreds of miles of underwater and soft-ground tubes in the past century. Compared with its modern hydraulic-operated successor, Brunel's shield, of course, was crude. Jacks for shoving and for holding the breastboards were hand-operated screws. But the principles of excavating within a protected chamber, shoving the shield against the lining, and holding the face with mechanical jacks persist to this day.

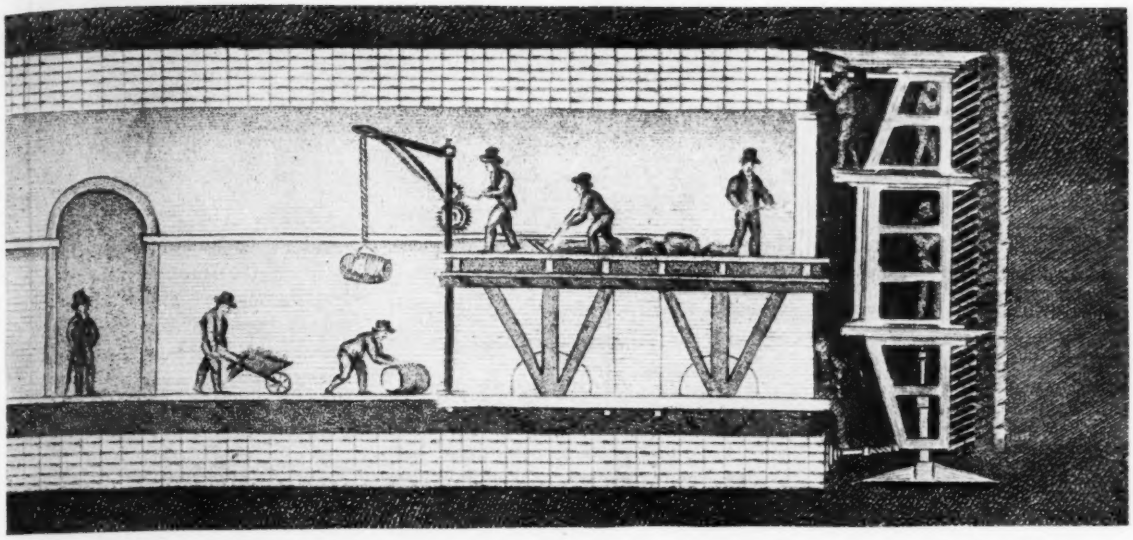


Details of one of the 12 sections of Brunel's Thames Tunnel shield. Hand screw jacks (not shown) at top and bottom of the section propelled the shield by shoving against the masonry lining. The breast-board jacks can be seen at the front of the section.

The tunnel, 1,200 ft. long between the Wapping and the Rotherhithe sides of the river, was designed as a two-lane carriageway. It is a rectangular brick structure 38 ft. wide and 22½ ft. high, overall, with a 3½-ft. center wall separating two arched roadways 13 ft. 9 in. x 16 ft. 4 in. Construction access was through a 50-ft. dia. shaft 63 ft. deep sunk as a brick caisson on one bank, later equipped with a spiral stairway for pedestrian use.

Original plans contemplated roadway approaches through spiral inclines on a 4-percent grade in 200-ft. dia. shafts, but difficulties in driving the tunnel sapped the financial resources of the company and these novel approaches were never built. The tunnel was opened to pedestrian traffic Mar. 25, 1843. In 1866 the East London Ry. purchased the tunnel, and, after completion of suitable approaches began operating trains through the bore in 1869. The final cost of the tunnel was 468,000 pounds.

The first tunnel under the Thames



Brunel's first shield at work in the Thames Tunnel a century ago. This longitudinal section through the heading shows operation of the shield and placing of the lining.

River was proposed in 1799, but nothing was done until a shaft was started on a second scheme in 1804. This shaft, 11 ft. in diameter, was sunk 42 ft., then reduced to 8 ft. dia. to a depth of 76 ft. From the shaft a small drift was driven under the river for 923 ft., only 150 ft. from the opposite shore, then the project was abandoned as too difficult. Various other plans were proposed, but never carried out until Brunel advocated a double-roadway tunnel in 1823.

He received permission from Parliament to go ahead on June 24, 1824, and started sinking a 50-ft. dia. shaft on the Rotherhithe side. The shaft started as a caisson of 3-ft. thick brick walls, 42 ft. high. A steam engine on top of the caisson pumped out water and hoisted the muck. The caisson was stopped at 65 ft. depth, but a 25-ft. dia. sump was sunk 15 ft. deeper. From the caisson bottom a full-size heading was started under the river, on a 2.25 percent downgrade to insure ample cover at mid-river.

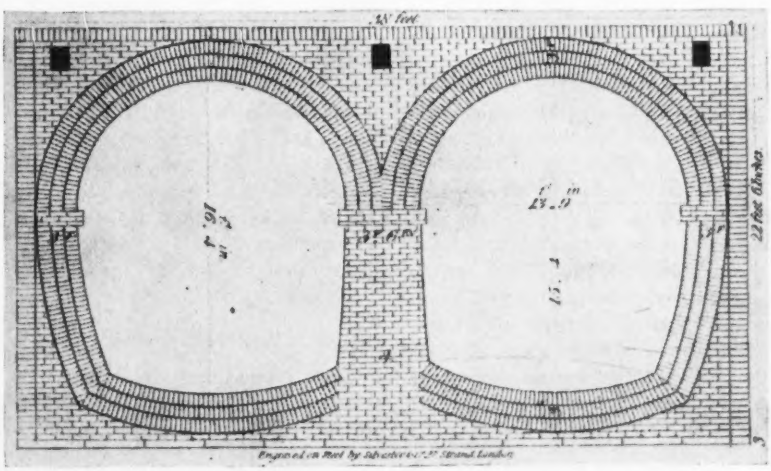
Brunel's shield consisted of 12 independent, open-end iron-frame sections, each 3 ft. wide and full height of excavation, 22½ ft., set side by side. Each section was divided into three compartments by platforms, making 36 compartments in all, each just big enough for one miner to work in. The top and bottom of each section was made up of plates, adjustable through screw jacks, with the bottom plate or shoe fastened to the frame by a ball-and-socket connection. At the top and bottom rear of each section was a hand-operated screw jack for shoving the section ahead. The sections worked independently, sliding past each other. A series of screw jacks at the front of each section held breastboards in place, the same principle being applied in modern shields.

Shield driving started through clay on Jan. 1, 1826. This was long before the days of comyressed air, so the operation was a constant hazard.

The first trouble came soon, for on Jan. 25 the top of the clay bed broke out into sand and gravel, resulting in a considerable inflow of ground and water. By March 11 this bad stretch of ground was passed. Serious difficulties were encountered on May 18, 1827, and again in Jan. 1828, when the face blew in, flooding the tunnel on each occasion. In both cases the heading was recovered by placing a blanket of bags filled with clay over the tunnel and pumping out, though for a time the whole project was in danger of being abandoned.

The heavy brick lining and roadway arch masonry were built directly behind, but not under the protection of, the shield.

Lack of funds shut down the job in December 1828, and work was again resumed in 1835 under a Treasury grant of 250,000 pounds, but was not completed for pedestrian use until March 25 ,1843.



The tunnel structure is massive brick masonry arches and lining as shown by this cross section.

Cities Increase Postwar Planning

***Contents in Brief**—Expansion of municipal activities and services after the war are expected to occur principally in the fields of recreational facilities, garbage collection and disposal, sewerage facilities, street improvements and airport expansion. Postwar funds now are being accumulated for the purpose and detailed plans are being formulated.*

INTENSIFIED PLANNING by municipalities to meet postwar problems is gaining in momentum, with cities in increasing numbers joining the movement, is reported in a recent survey by the International City Managers' Association, Chicago. Of 92 cities covered in the survey, all but 10 are attempting through planning agencies of one type or another to estimate postwar conditions with respect to population, employment, public works and conversion of war industries.

Most of the cities covered in the survey have established, or are in the process of setting up, reserve funds to finance reconstruction and development activities after the war. Postwar planning is being directed by official planning agencies in the larger cities; by the city engineer's office usually in medium-sized communities; and by the mayor or city manager in smaller towns. Usually the planning agency advises only; the work being done by the planning engineer, city engineer, or other administrative personnel.

Population of cities reporting

Eleven cities of over 75,000 population, reporting to the association, are actively engaged in estimating postwar conditions, with non-governmental groups cooperating with eight of the cities. Of 62 cities having less than 25,000 population, surveyed by the association, all but six are preparing for the postwar era. Of the 19 cities of 25,000 to 75,000 reporting, ten have official planning agencies, one has an advisory committee, four have non-governmental agencies cooperating with the cities, while four have neither a planning agency nor any individual assigned to the work.

In Cincinnati, engineering services and the planning commission are developing comprehensive postwar projects which are being coordinated by a bond-improvement committee. Dallas has employed a planning consultant and the public works department is developing plans and specifications for street, water and sewer projects; park improvements; a public market and airports. Flint, Mich., has listed 52 "most necessary" future projects, while Kansas City, Mo., has prepared a long list of improvements including two large housing projects and a new auxiliary airport.

Financial reserves

Establishment of financial reserves for this expanded construction is being accomplished by several methods, says the report, such as setting aside cash from surplus funds, investing surplus funds in war bonds, setting up depreciation accounts for replacement of equipment and utility extensions or by paying off present indebtedness. In addition to these methods, the survey shows several communities are maintaining present tax rates to bolster financial reserves, while one city, Schenectady, N. Y., has levied an additional tax for the same purpose.

Several cities report tax limits make it impossible to build up reserve funds, and a few cities in Iowa, Oklahoma and Texas have no authority for establishing such reserves. Only five of the 62 cities of less than 25,000 reported that no action has been taken to establish some kind of postwar fund.

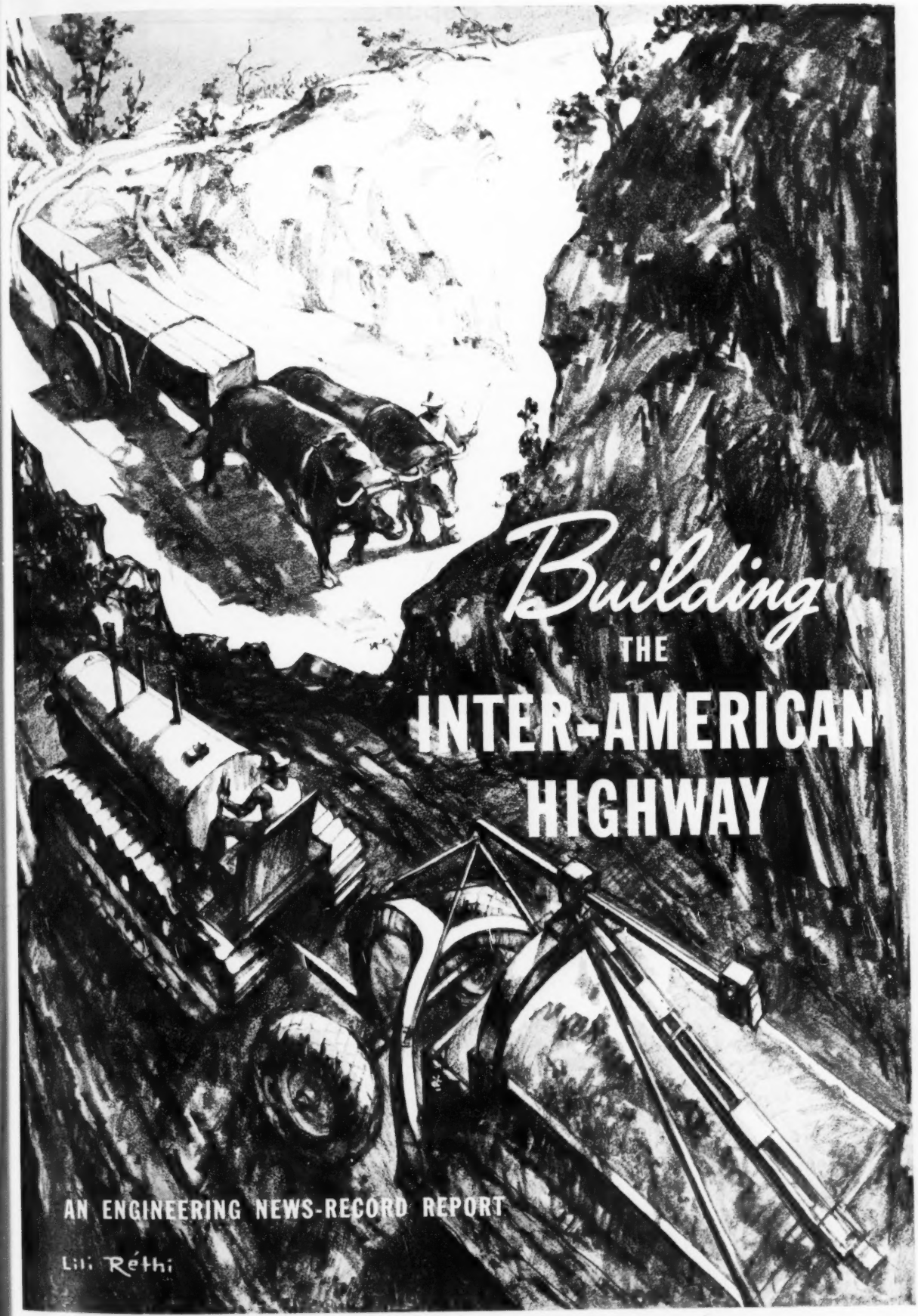
Expanded services

That present municipal activities and services generally will be expanded after the war was the consensus of city officials interviewed in the survey, and they do not anticipate a general transfer of municipal services to other governmental units, such as county or state. City officials believe the main emphasis in regard to new or expanded municipal services appears to center on recreational facilities, garbage collection and disposal, sewerage facilities, and airport expansion. One city believes the state will provide boulevard connections with bypass highways. Another has recently transferred health services and hospitalization of charity patients to the county, while one city is developing a city-county health unit. An expansion in waste collection activities, highway maintenance and hospital service is being planned in Cincinnati. Flint, Mich., plans for additional hospital and recreation facilities and Schenectady will have additional water supply, hospital and health activities. Transfer of present public services to the county or state is anticipated in only two of the 19 cities of 25,000 to 75,000 population, according to the report. A new contagious disease hospital is being planned at Watertown, N. Y., while Colorado Springs, Portsmouth, Ohio, Portsmouth, Va., and Wilmington, N. C., anticipate an expansion in recreation services. Roanoke, Va., will provide additional water facilities, sewage disposal plants, arterial highways and bypasses.

Status quo for smaller cities

Fifty-two of the smaller cities do not anticipate transfer of any present services to another unit, however, three expect some street construction and maintenance work to be taken over by the state, while two cities anticipate the state will assume their present welfare work.

The report showed that new or expanded services, mainly in public works and recreation, are being planned by 40 cities. Nine will start garbage collections, six are planning additional airport facilities, and seven cities plan for additional sewage disposal. In addition, many cities are looking forward to street repair work, replacement of worn-out equipment and construction of housing projects.


Building
THE
INTER-AMERICAN
HIGHWAY
AN ENGINEERING NEWS-RECORD REPORT
Lili Réthi

Salient Features of this ENR Report

UNDER CONSTRUCTION in six Central American republics are 956 miles of road to complete the 1,569 miles of the Inter-American Highway between Mexico and the Panama Canal. The work is a joint war project of the U. S. Engineers and the U. S. Public Roads Administration operating in cooperation with local highway departments. This *Engineering News-Record* report on the project describes, among other things, these salient features:

Historical background — During the past decade several sections of the highway were constructed, but with America's entrance into the war long stretches remained to be completed, including much difficult construction. These missing links are now being closed with an all-weather military road to provide an overland route to the Panama Canal.

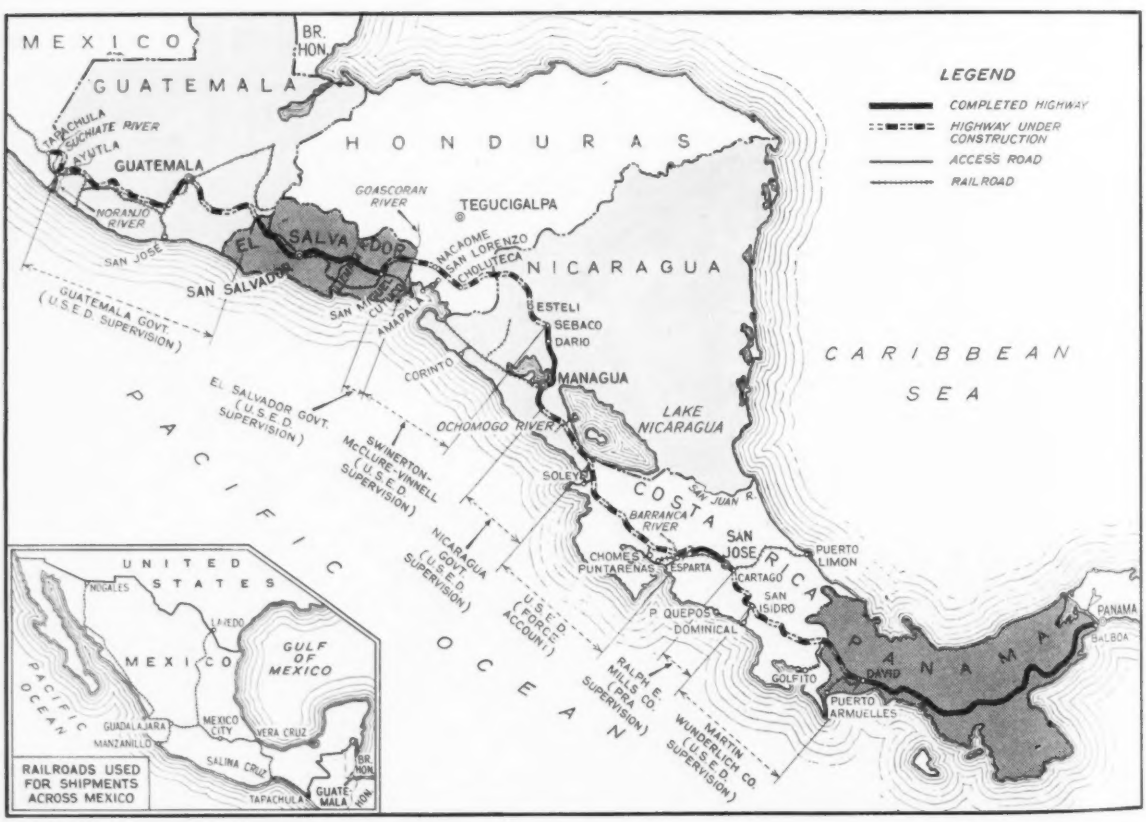
Locating the road — Because the highway penetrates some of the thickest jungle in Central America in which long stretches were almost inaccessible, the survey parties were forced to work under extremely difficult conditions in isolated areas. In many cases the men had to "live off the country." Furthermore, they had to complete the location surveys with speed.

Delivery of materials — Three major difficulties in getting supplies and materials to the job are the limited amount of supplies to be obtained locally, the few ships available for transportation of materials from the United States, and the wholly inadequate transportation facilities within the various countries. Rail deliveries across Mexico have aided in reducing the need for water shipments to Central America. From the ports and rail terminals every method of transportation known locally is used, ranging from oxcarts and pack trains to tractors, jeeps and airplanes.

Housing the Workmen — About twenty-five thousand workers are engaged on the project. Many of these men are housed in camps in areas where water supplies had to be developed, sanitation and hospital facilities provided, and malaria-control work carried out. Furthermore, immunization facilities for both citizens of the United States and local workmen had to be provided.

Construction Operations — An all-weather, military-type road surfaced with crushed rock or gravel is being built. Construction varies from earthwork by wheelbarrow with local labor to the use of modern American-made equipment operated either by local workmen or by those from the United States. Steel-truss spans are used for the longer permanent crossings, but several temporary timber-truss bridges are being built.

Portions of the road will be completed this year, but much construction will remain for 1944. These construction operations, including grading, surfacing and bridge work, are to be described in subsequent articles.



ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Building the Inter-American Highway

Part I—History, Surveys, Access and Housing

A. N. Carter
Assistant Editor, Engineering News-Record

● To observe how the Inter-American Highway is being built, A. N. Carter, assistant editor of *News-Record*, spent six weeks on the project. Starting at the Mexican border, he traveled over the sections of the War Department work with Col. Edwin C. Kelton, director of all construction by the U. S. Engineers. Returning to San Jose, Costa Rica, from the Panama Canal Zone, further inspection was made in company with M. L. Harshberger, resident engineer in Costa Rica for the Public Roads Administration. To these men and to the many engineers, contractors and highway directors of the various countries who so willingly gave their time and shared their living quarters, food and transportation, *Engineering News-Record* and the author are greatly indebted.—The Editors.

DOWN IN CENTRAL AMERICA about fifteen hundred United States engineers and construction men are fighting a war of their own. Aided by some twenty-five thousand local workers, they are building the section of the projected Pan American Highway that lies between Mexico and the Panama Canal, known officially as the Inter-American Highway. Their enemies include: lack of transportation facilities, dense tropical jungle, malaria and other tropical diseases, loss of key men to the draft, shortages of local skilled labor, lack of local road-building materials, and rainfall as heavy as 300 in. yearly in some areas. In addition, they are faced with the task of completing the road as quickly as possible with a minimum of strategic materials.

The project is to provide an overland route to the Panama Canal to facilitate its protection and to permit greater participation in the war effort by the Central American republics through which the road passes. The work starts at the Suchiate River, a part of the Guatemala-Mexico border. As the map on the opposite page shows, from Mexico the road extends southeastwardly across Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and western Panama. The only Central American country it fails to touch is British Honduras.

For the major portion of the route, the road passes through an area of great beauty. High mountain ranges of volcanic origin are common and the highway runs for much of its length in the mountains. The road crosses and recrosses the Continental Divide, being more than a mile high in several sections and attaining an altitude of over two miles at one point.

Construction of a modern highway through Central America has been contemplated for two decades. In 1923, at the Fifth International Conference of American States at Santiago, Chile, a resolution was passed calling for a general study of such a road by the Pan American Union. At numerous similar conferences, attended by highway engineers representing most of the Latin American countries and the United States, construction of the road was considered.

In 1929 the Congress of the United States appropriated $50,000 for a reconnaissance survey, which was completed in 1933. During the next few years some sections of the road were built, especially in Guatemala, El Salvador, Nicaragua and Panama. Much of this work was done under supervision of U. S. Bureau of Public Roads, now the Public Roads Administration, in accordance with agreements between the state departments of those countries and that of the United States.

However, with the entrance of this nation into the war, over 950 miles of the highway, spread over six countries, remained to be built or reconstructed. Because of the possibility of attacks on the sea routes to Panama, the United States on Dec. 26, 1941, authorized expenditure of $20,000,000 to complete the highway as a military road. One-third of the construction cost was to be met by the several Central American countries where the road followed the original location for the Inter-American Highway. For the most part, the road now being built follows the original location.

Early in June, the Chief of Engineers directed Col. Edwin C. Kelton to close the missing sections of the highway with an all-weather road over which military traffic could move. Although about one-sixth of the 1,712 miles of the Inter-American Highway across Mexico remains to be built, the U. S. War Department did not undertake to facilitate completion of that work, since a satisfactory standard-gage railway connection between the U. S. and northwestern Guatemala is available.

The road planned by the War Department was to be constructed without the aid of troops, and the surveys and plans were to be prepared by civilian personnel under supervision of engineer officers. Local labor was to be used to the greatest extent possible, but Colonel Kelton was authorized to engage either local or United States contractors to do the work.

Colonel Kelton immediately established area offices at Managua, Nicaragua, and San Jose, Costa Rica, and a district office at Los Angeles for administration, control of shipping, and mobilization and procurement of equipment and supplies. He placed the work in Guatemala, El Salvador, Honduras and Nicaragua under the supervision of the Managua office, and assigned the remaining work to the San Jose office.

To complete the project in the shortest possible time with a minimum of work and critical materials, a highway of 16 ft. overall width, surfaced with 8 in. of crushed stone or gravel was specified. Every six miles a turnout 4,000 ft. long was to be provided by widening the roadway to 24 ft. or more. These turnouts were to aid convoys and other military traffic in passing. Grades on the highway were to be limited to 7 percent, except in extremely mountainous areas, where 10 percent could be used sparingly. The curves were to have a minimum radius of 200 ft. as a working standard. Actually, most curves are less sharp, and long sections with few curves under a 1,000-ft. radius are common.

When completion of the highway was decided upon by the War Department, the Public Roads Administration already had started construction of a difficult 71-mi. section of the road in Costa Rica. This work was being done under agreements permitted by an act of the U. S. Congress passed Dec. 26, 1941. Construction was well advanced, and the PRA is to complete this project according to original plans to provide a permanent link in the Inter-American Highway.

An agreement was reached whereby the PRA would reimburse the U. S. Engineers for all permanent drainage structures built by the latter organization during construction of the military highway. This reimbursement will be permitted provided the structures can be used in the proposed future reconstruction of the military road by PRA to make it a permanent part of the Pan American Highway system.

The standards followed on the PRA work compare favorably with similar roads in the United States. The controlling speeds on which the PRA designs are based vary with the topography, ranging between 30 and 60 mph. Different speeds apply to different portions of the road, and sight distances and alignment are planned to conform. Across rugged terrain, the sharpest blind curves are of 197-ft. radius and the sharpest open curves of 164-ft. radius. All except the very flat curves have spirals, and transition spirals are used between adjacent curves in the same direction. The surfacing will consist of 8 in. of crushed rock and a 2-in. asphalt wearing surface.

Bridges on the War Department work are designed for an H-15 loading, and they are to provide a 15-ft. clear roadway. Where feasible, the piers and abutments are built of sufficient width to permit future widening of the roadway to 24 ft. Exceptions to the one-way bridges are some 20 major river crossings, which are being constructed to full width because of their large size and the difficult problem of future widening. These 20 projects are supervised by the PRA.

LOCATION PRESENTED MANY PROBLEMS

One of the major problems in getting construction under way has been the surveying and location work. On some sections of the road, this operation was well advanced by the local highway departments when the U. S. government forces moved in, but in other areas little had been done.

For example, of a 300-mile section in Costa Rica and northern Panama only about 45 miles had been surveyed and only a short length of the remainder had been "flagged" by a reconnaissance crew. In Costa Rica, for example, the road climbs to an elevation of 10,900 ft., and for 150 miles there is no direct access to the route. Furthermore, it cuts through a practically uninhabited jungle, which is said to be the heaviest in Central America. The difficult location work in these two countries typi-

Advance surveying crews often lived in camps isolated by several days of travel from the other workers. At this Costa Rican camp the tents are for the United States workers and the "palmetto" huts for the natives.

Major portion of the surveying and location work had to be done in the rainy season, which proved difficult with heavy rains daily and yearly rainfall of 300 in. in some areas. The crews soon became accustomed to fording streams on foot.

fies that encountered in other long sections.

Location and surveying operations on this section of the highway were comparable to the early railroad locations in the western United States through the then little-known mountainous country.

Airplane surveys of little value

On location work, airplane reconnaissance aided to some extent, but its value was lessened because there were few landmarks distinguishable from the air that could be identified on the ground. Also, the rainy season in the fall of 1942 made further aerial photography impossible. Furthermore, the best maps available were of use only as a guide, as they had been compiled from inadequate data; in some cases, the rivers were found to be miles from the positions shown on the map. Thus, most of the work was done by location and survey parties working on the ground.

In order to get the parties to the job in the shortest time and to keep the men of the different parties together as a unit, many of the survey crews employed by the U. S. Engineers were flown to the point of operations in planes of the U. S. Army Air Transport Command. These parties, in most cases, were in the field within five to ten days after their arrival in Central America. Generally they worked from base camps, but where the various units of the party were widely separated, some worked from temporary "fly" camps along the line. A typical base camp consisted of three to five tents with board floors and partially boarded sides. The "fly" camp facilities varied from one or two tents to "palmetto" huts.

Locators "flagged" most of the line. They made a rough location with compass and clinometer and placed flags at the key points. This operation was extremely difficult over the greater portion of the territory because dense jungle growth prevented a general view of the country. Frequently the locator ran a line down a ridge, cutting a trail with machetes, only to encounter some impassable obstacle, such as a vertical cliff, after running a considerable distance.

Survey parties followed a few miles behind the locator. A typical party consisted of 12 to 15 Americans, including a cook, and about an equal number of native brush cutters. Supplies for the parties were dispatched by airplane to the nearest landing field. From the field they were transported by pack train, and in a few instances, by laborers on foot, for distances up to 20 miles over trails at times barely passable for mules or horses.

Survey parties in four groups

The survey parties were divided as follows: (a) Two office men; (b) a transit party to run preliminary lines; (c) a level party to run bench levels and profiles, and (d) a cross-section gang.

Some areas were comparatively

Laundry facilities and barber shops were crude in the early surveying camps and the men often had "to live off the country."

clear, but for the most part the paths for the center lines and cross section measurement had to be cut through dense undergrowth. When the cross-section data had been obtained, a route was "projected" on paper in the field office and, in some cases, staked and recross-sectioned in the field. These data also were sent to the area office, where the line was checked and, in some cases, modified. Grades were adjusted to balance quantities as closely as possible.

Contour maps were prepared by the field parties at each of the major stream crossings on a scale of 1 in. to 20 ft. on a 2-ft. contour interval. Also, highwater levels were observed and reported by the surveymen on all of the principal streams and on most of the small drainage crossings. These data were checked by field hydrologists who worked on the line and from personal observations and discussions with local residents, made estimates as to the size of drainage structures required.

Because of the type of terrain, and because many of the drainage structures are to be temporary, the U. S. Engineers did not map all the drainage areas nor calculate the required drainage openings. However, since all the bridges and culverts on the PRA section are to be permanent structures, as many as possible of the smaller areas were surveyed on that work. These structures are designed to pass the runoff from heavy tropical rains of several hours duration over mountainous country.

To study all possible routes the "locators" often rode horseback day after day through heavy jungle along narrow steep trails where the mud was so deep that a fresh horse had to be secured each day.

Speed of surveys varies

Speed attained by the survey parties varied greatly, depending upon terrain, weather and accessibility. The slowest speed was 3 miles per month for a section through the almost uninhabited jungles of southern Costa Rica; the greatest speed was a survey of about 40 miles in two months made by one party.

In this latter case, roughly one-third of the line was through very hilly country covered with bush and jungle, and the remainder through a comparatively clear and gently rolling area. The 40-mi. section was part of a 60-mi. gap where the route could not be chosen until early in November, 1942. Since accessibility to this particular territory made it one of the first sections where construction could start, completion of the survey in a short time was vital.

The job was started at several points, the several survey parties being scattered along many miles of the line in temporary fly camps. Often the centerline party worked directly on the heels of the locating engineer from advanced fly camps moved weekly. The last party took topography at the bridge sites. In spite of the lower accuracy of this survey, due to the necessary speed, a set of plans upon which construction could be started without delay was made available. Some portions of the line have been revised to take advantage of conditions revealed by fuller study, but for the most part the road follows the location first chosen.

Most surveys were made during the rainy season under very trying conditions. Because of the shortage of air transportation, it was impossible at times to keep the camps adequately supplied with food, hence the men had to "live off the country." Also, inadequate communication made it impossible to keep in close touch with the survey parties. In the case of one party in northern Panama and another in southern Costa Rica, de-

To cross the Brus River in Costa Rica, surveyors employed by the U. S. Engineers built this bridge with a 1¼-in. cable 300 ft. long. One end was tied to a tree about 15 ft. above the ground, and the other end carried over a timber A-frame and tied to a deadman. The cable was tightened by a 1½-ton car jack. The suspenders, of 1-in. rope and on about 10-ft. centers, were installed by a workman in a bo'sun chair suspended from a pulley moving along the cable.

livery of messages required from one to two weeks.

Despite these conditions, the morale of the survey parties as a whole was excellent. Some of the men spent six months in isolated jungle areas without visiting the nearest settlement. In general, there was very little sickness, except in the lowlands of Costa Rica, where a number of cases of malaria developed. One party worked five months, seven days a week, with only a few man-days being lost. Also, of the original survey parties, 90 percent of the men are still on the job.

ACCESS PROVES TO BE DIFFICULT

Getting equipment and supplies to the job has been and still is the greatest problem throughout the length of the entire Inter-American Highway project. Transportation of cargo from the United States to the various Central American seaports not only requires several weeks because of the distances involved, but to obtain shipping space always has been difficult, and at times impossible. In addition, the number of good Central American seaports is limited, and in most cases water shipments had to be unloaded under difficult conditions.

Equally difficult are the transportation operations within the countries through which the highway runs. For the most part the highway passes through jungle areas where railroads are practically unknown and access roads for the most part are non-existent. As a result, delivery of supplies has been slow and expensive.

Estimates placed the freight to be shipped to the Central American countries for construction of the Inter-American Highway at 50,000 tons—20,000 tons by the U. S. Engineers and 30,000 tons by the Public Roads Administration, the latter including material for the permanent bridges. The War Department and PRA started shipping supplies in quantity in September, 1942, and as of June 1, 1943, the two organizations had shipped 33,000 tons and had on hand 21,000 additional tons to be forwarded. The rate of shipping is now 3,000 tons monthly and is expected to continue at about this rate.

The original plan was that the War Shipping Administration and the Army Transport Service would make ships available. However, combat activities of the U. S. Army and Navy, especially during the African campaign and the Solomon Islands activities, reduced greatly the amount of space available for shipments to Central America. Consequently rail shipments across Mexico were necessary.

Extensive rail shipments

Of the shipments to date from the United States, about 40 percent have been by rail. Most of these shipments start at Los Angeles, Calif., where freight has been stored waiting for water transport space as originally planned. The rail shipments move to Manzanillo and Salina Cruz, Mexico, both on the Pacific Coast. By this route the shipments for the latter city have to pass through Mexico City, then to Vera Cruz on the Gulf of Mexico, and finally to the Pacific Coast of Mexico (See map p. 82). As a result, a long indirect haul, taking several weeks after the material leaves the United States, is required.

Some of the freight is shipped by water from Manzanillo and Salina Cruz to Central American seaports near the highway. This plan is to save handling in the transfer required at Ayutla, Guatemala, because of the difference in the gages on the Mex-

(*Continued on p. 91*)

Bishop photo

Harbor facilities are limited along the Pacific Coast of Central America. At Dominical, Costa Rica, where the facilities are better than at many other points, supplies are delivered in barges at high tide and unloaded at low tide by derrick.

Engineers on the

In Charge for U.S. Engineers

Maj. F. S. McNamara, *deputy director, spends most of his time in Los Angeles.*

Col. Edwin C. Kelton, *director of all work by the Army Engineers.*

Lt. Col. W. W. Zass, *area engineer in charge of the Managua office.*

Maj. M. N. Thompson, *area engineer at San Jose.*

Capt. Clyde V. Kane *(above), chief of engineering department at Managua.*

Maj. Harold E. Spickard, *chief of the engineering division for all of the work by the U. S. Engineers.*

Maj. Rex J. Allen *(left), chief of the engineering division at San Jose.*

Inter-American Highway

In Charge for P R A

E. W. James, *chief, Inter-American regional office, Washington.*

W. H. Schwiesow, *resident engineer in Honduras.*

W. C. A. Palmer, *resident engineer in El Salvador.*

M. L. Harshberger, *resident engineer in Costa Rica.*

Milton J. Adams *(above), resident engineer in Nicaragua.*

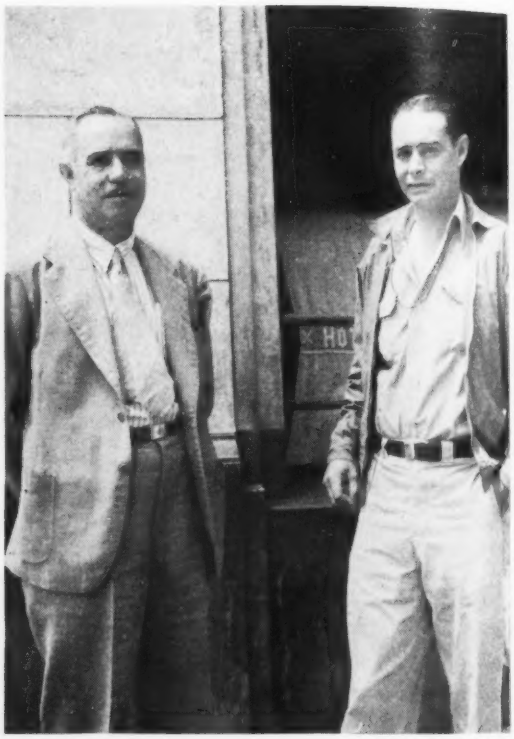
Glenn I. Gibbs *(right), office engineer at San Jose, Costa Rica.*

J. K. Flick, *loaned by PRA to the Export-Import Bank as certifying engineer.*

Engineers on the Highway

For Central American Republics

Col. C. E. K. Bickford *of the Guatemalan Army is chief of the Inter-American Highway work in Guatemala.*



Jaun P. Camino *(left) is director general of highways in El Salvador and* **Rafael Zaldivar** *(right) is highways inspector general.*

Jaun Ig. Gonzalez *is minister of the public works department in Nicaragua.*

Luis Paulino Jimenez *is director general of highways in Costa Rica.*

Salvador Aguirre *is representing the national government of Honduras.*

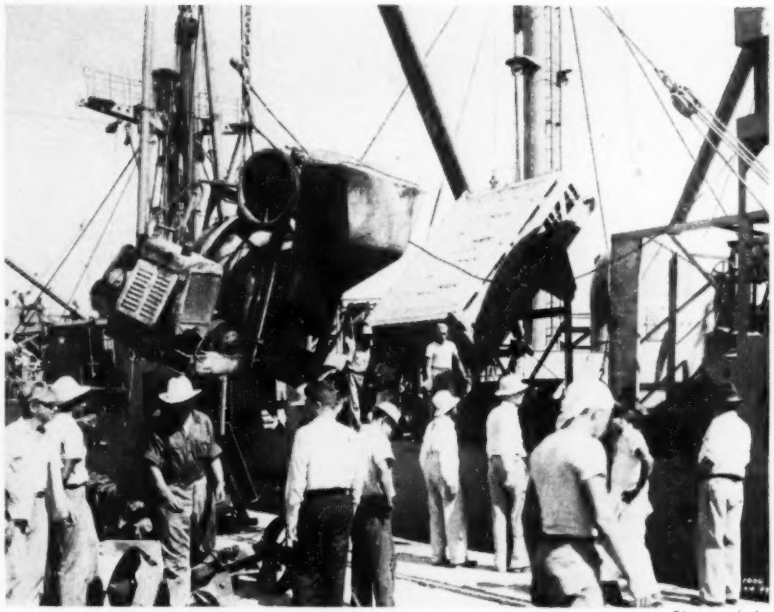
Unfortunately, a photograph of Victor Nelson Juliao, highway director in Panama, was not available—The Editors.

ican and Guatemalan railroads. However, most of this freight continues by rail to Ayutla. Until Nov. 10, 1942, no railroad bridge was available across the Suchiate River, the border between Mexico and Guatemala. Thus, transportation of rail cargo across the stream by boat was necessary for several weeks, which limited the size of package that could be shipped. The bridge now available is of standard gage.

At Ayutla the freight is transferred to the narrow-gage International Railways of Central America, which operates through Guatemala and El Salvador. Supplies for local use in Guatemala are unloaded at Guatemala City, and those needed in El Salvador at San Miguel, Salvador.

Freight also can be moved by rail all the way to Cutuco, El Salvador, for transshipment. From the railroad siding at Cutuco, much of the material is transshipped by water to San Lorenzo, Honduras, and a portion to Corinto, Nicaragua. Also, from Cutuco, some cargo is transported by ship or barge as far south as Puntarenas, Costa Rica. From San Lorenzo, supplies and equipment can be trucked or "walked in" under its own power to Nacaome and Choluteca, Honduras, on the highway.

Besides being slow, rail shipments through Mexico are limited greatly by maximum clearances of 10 ft. 6 in. horizontal and 14 ft. 1½ in. vertical, and the use of cars not over 50 ft. 6 in. long. They are further restricted in Guatemala, where a horizontal width of 9 ft. 6 in. only is permissible. For rail transportation, some pieces of equipment, such as carrying scrapers were "cut down," the parts being quickly welded together when they were unloaded at the railroad siding. However, dismantling of scrapers and other large machines proved impractical.



Bisnop photo

A small concrete mixer being unloaded from a 10,000-ton freighter at Puntarenus, Costa Rica. Transportation to the highway was a difficult problem.

To get the work underway as soon as possible, limited amounts of supplies were delivered by airplane. Here, a small tractor is being unloaded at San Isidro, Costa Rica for use by crews of the Martin Wunderlich Co.

Water shipment problems

In addition to the small amount of space that actually has been made available, shipments by water are further restricted by the type of vessels available. Frequently the ships are small and are not equipped to transport bulky cargo nor shipments of large weights.

Another big handicap in the shipping program has been the inadequate storage space at the unloading points, especially tank space for oil and gasoline. Still another problem has been the frequent cancellation of shipping space but a few hours before sailing time.

The major point in the United States for water shipments was expected to be the Los Angeles-Long Beach harbor area. However, from New Orleans, La., 1,000 tons of cement, 300 tons of equipment, 1,250 tons of old bridge steel and a few tons of corrugated culvert material originally planned for the Panama Canal Zone have been forwarded.

The bridge steel consisted of four truss bridges built in 1916 on a line of the International Railway near Buffalo, N. Y. One structure was dismantled, shipped by rail to New Orleans and then by barge to Puerto Limon, Costa Rica, on the Gulf of Mexico. From there the bridge was transshipped by rail to Esparta, Costa Rica, near the highway. The three other crossings are to be moved by water from New Orleans to Cristobal, Panama, and then transshipped to the point where needed.

The only regular freight line used

Ox teams are used extensively for local hauling. With work continuing 24 hr. per day, the native drivers installed kerosene lanterns on their carts.

For long lengths of the highway access roads were lacking but in some areas oxcart trails could be used. However, these were so very narrow that two-way traffic was difficult, and the jeeps often had to make way for the native oxcarts loaded with bridge timbers.

to deliver materials by water from Los Angeles directly to the Central American ports is that of the United Fruit Co. Every United Fruit boat sailing from Los Angeles since last September has carried freight needed for the highway project. These vessels, because of their small size and restricted lifting equipment, are limited to moving cargo with the individual pieces weighing less than three tons. They unload at San Jose, Guatemala; Cutuco, El Salvador; Corinto, Nicaragua and Puntarenas, Costa Rica. In all, the United Fruit boats as of June 1 had moved a total of only 5,000 tons of cargo for use on the highway. The vessels will not carry cement and creosoted timber, and their lifting equipment is so limited that loads heavier than five tons cannot be handled.

Water cargo transshipped

A large portion of the water shipments went directly from Los Angeles to Balboa, Panama. This direct shipment to Balboa was made for two reasons. First, some boats were used that did not make stops at points between Los Angeles and Balboa. Second, at Balboa equipment could be transferred to barges to be moved back to Pacific ports where adequate harbor facilities were lacking for larger boats. Balboa also is a shipping point for materials and equipment procured in the Panama Canal Zone.

Much of the material shipped from Balboa went to ports of Puntarenas, Golfito and Dominical, Costa Rica, and to Puerto Armuelles, Panama. The total movement from Balboa, as of June 1, had been 7,700 tons, including 4,000 tons procured in the Canal Zone and 3,700 tons shipped from Los Angeles to Balboa for transshipment.

Inland transportation difficult

Every possible method of moving freight has been used to transport materials from the Central American seaports to the highway, including oxcart, airplane, jeep, barge, truck, tractor and, to a number of outlying camps, pack mules and horses. From Golfito, Costa Rica, a narrow-gage railroad owned by the United Fruit Co., was extended to near the Costa Rica-Panama border. From the end of this new line an access road was built to the highway.

At Dominical, Costa Rica, an access road 21 miles long had to be built at a cost of about $800,000 to permit delivery of supplies to the highway near the town of San Isidro. Cargo designated for Dominical is transported by barges which are beached at high tide and unloaded by a stiff-legged derrick erected by the contractors (See p. 87). Unloading facilities at several of the other ports are more primitive.

For some commodities, rail transportation costs less than by water. For example, rail deliveries to ports along the coastline of Honduras, Guatemala and El Salvador is 10 to 30 percent cheaper than by water. In contrast, rail shipment of some bulk commodities is 150 percent higher than water transportation. Nevertheless, the lack of boat space makes necessary rail shipment of much bulk material.

All the rates are extremely high. As a result, gasoline, delivered on the job in Costa Rica, costs $1.50 or more per gallon. Cement costs $3 or more a bag delivered in Guatemala and over $4 at many points farther along the road. Cost of other materials delivered to the job are equally high.

Material deliveries are very slow. Exceptions are the emergency sup-

plies and repair parts delivered in a few days by the U. S. Army Air Transport Command, which has been most helpful. Little commercial air express from the United States has been used, but even such freight takes three weeks from this country to that in which it is to be used, since the commercial airlines have so much express on hand in the United States waiting shipment.

Four months by rail

Rail shipments from Los Angeles to Guatemala require two months, and water cargo sent from Los Angeles to Balboa, Panama, for transshipment back up the Pacific Coast often takes four months to get to the job.

In contrast, if ships had been available for direct shipments to Corinto or Puntarenas, deliveries could have been made in two weeks.

In addition to the restrictions on forwarding supplies from the United States, procurement of materials within the Central America countries is most difficult. Some cement has been obtained in Nicaragua and Guatemala, and a large quantity of lumber has been purchased locally in all the countries through which the highway passes. With these few exceptions, most materials have been procured in the United States because they were non-existent in Central America.

When other forms of transportation bogged down, tractors equipped with frames to accommodate a load of four tons proved an answer to the deep mud encountered in the high mountains of Costa Rica.

HOUSING AND SANITATION ALONG THE ROAD

Housing and sanitation are receiving major attention along the Inter-American Highway because they are vital factors in speeding the work. Housing does not have to be provided for all of the 25,000 to 30,000 workmen engaged on the project, many thousands being natives who live in the towns or in quarters provided by the local governments. Sanitation and health measures, on the other hand, extend beyond the limits of the project to include aid to the medical authorities of the local communities in control of tropical diseases. Medical care for the 1,500 construction men and engineers from the United States begins with inoculations and vaccinations before they leave this country, and never is far from them on the highway.

Camps range in size from temporary ones housing a few men, such as is used by the survey parties, to large ones housing 500 to 600 workmen. At present there are about twenty of the latter, and there are probably fifty camps housing from 20 to 30 men. No great amount of attention can be given to selection of sites for the small camps, but considerable care is exercised in selecting the locations for the large ones.

Drainage of site important

Natural drainage conditions and water supply are major factors in the site selections. All camps are isolated as much as possible from local communities because, quite generally, sanitation and malaria control around the native towns is poor. In some areas during certain seasons 90 percent of the native population have malaria.

After the general location for a large camp has been decided upon by the contractor's staff, a medical officer of the U. S. Army is called in to look over the area and to indicate the most ideal site from the sanitation standpoint.

Springs are used for water supply at a few points, but more frequently wells are dug. Rivers cannot be used as a source of supply because practically all are polluted and carry amœbic dysentery germs.

In almost every case the water for drinking purposes is boiled or is treated in water purification units of the type designed for the field forces of the U. S. Army. These units are compact and may be set up in the camps or left on a truck if the camp is to be moved in a short time. The units provide for both chlorination and filtration. The latter treatment is required for effective removal of the amœbic dysentery bacteria if the water is not boiled. Each camp is equipped with a standard chlorinator

Bishop photo

Three stages of development in constructing a labor camp is here illustrated. "Palmetto" huts common to Central America were built first, then tents with board sides were used, and finally timber-frame buildings with metal roofs, illustrated by the central mess hall at right, were constructed.

kit, which the camp health officer can use to test the water supply for residual chlorine. A residual of 0.1 ppm. is preferred.

Routine inspection of the water supplies are made by members of Army medical staff to determine whether the instructions as to treatment are being followed. These men also keep close watch over general health conditions in the camp areas. Generally, a water sample is taken every two weeks at each camp. The samples are transported to a central laboratory for a bacteriological examination.

Housing for the native workers in Guatemala and El Salvador is provided by the local governments, which construct "palmetto" huts or native living quarters common to those countries.

In the other countries a large percentage of the workmen are housed in camps built by the United States construction forces. All of the latter camps are built to a prepared plan for good sanitation and to avoid crowding.

The usual camp layout consists of a central one-story, timber-frame mess hall and nearby living quarters of similar construction. Native workers are separated from workmen from the United States. Central wash rooms and toilets are provided. In many of the wash rooms hot water is available.

Small individual cabins are preferred as living quarters both from the health standpoint and because of the privacy permitted. In several camps small bungalows, each housing a few men, have been built. However, for greater economy of materials, in several other camps bunkhouses accommodating twenty to forty men have been constructed.

The bunkhouses are built with floors about three feet above ground level. This precaution is to minimize difficulties from tropical rains and insects.

To eliminate trouble from mud, all the buildings are joined by wooden walks or paths surfaced with crushed stone. Also, the living quarters at all the camps are screened. At the start of the present work it was impossible to get wire screening at some camps and mosquito netting had to be used. In most of the camps the men sleep under mosquito nets.

For the several thousand day laborers employed in Guatemala "palmetto" houses with thatched roofs, a type common to the country, were built.

Supervision of food supplies

All camp kitchens and mess halls are screened. Strict rules of cleanliness are enforced, and the kitchen workers are given frequent medical examinations to determine if they are carriers of communicable diseases. Most of the head cooks are from the United States, but the major portion of the kitchen help is hired locally.

Flour and canned foods for the camps are obtained from the United States, but large quantities of fruits

Good accommodations are provided at the camp constructed at San Marcus, Honduras, under supervision of the U. S. Engineers. Bunkhouses were built with lumber produced by a small sawmill on the site. Floors were raised 3 ft. above ground as protection against dampness and the insects. Screened openings below the eaves provide good ventilation.

and vegetables are purchased locally, as are most meats. Health officers in the camps are instructed to enforce the rule that no fresh vegetables are to be eaten raw unless peeled. This precaution is to guard against dysentery.

Butchering in most cases is done near the camp sites under the supervision of a health employee. To aid in the preservation of food, all of the kitchens are equipped with large refrigerators.

Few dairy products purchased locally are used as there are no pasteurizing facilities in most of the Central American countries. An exception is butter, experience having shown that butter may be purified by boiling without destroying its flavor.

Sewage disposal methods vary

Sewage disposal methods vary from camp to camp, but in no case is the raw sewage dumped into the neighboring streams. In some camps closed-type, pit privies are used, and in others flush toilet systems are employed in conjunction with septic tanks and disposal fields.

Because of the severe transportation problem in getting supplies to the camps, some sites were impossible. Therefore, it was necessary to use wooden boxes constructed from 1-in. lumber sawn locally as sewer lines. This substitute for pipe is inexpensive, and is expected to last the life of the average camp.

Malaria control in the camp areas is another important part of the health program. The most prevalent mosquito that carries malaria in Central America is the *anopholes albamanus*.

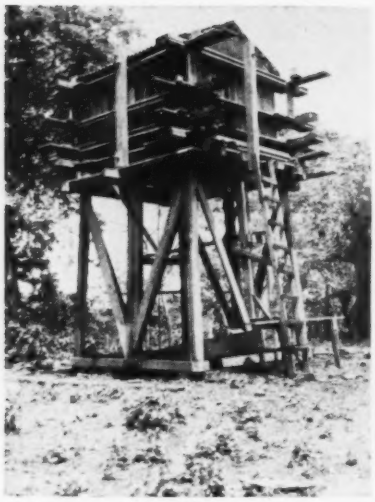
The major safeguard against mosquitos breeding is good drainage around the camp sites. Spraying the neighboring swamp areas with pyrethrium compounds to kill the adult mosquito is a second precaution sometimes taken. As an added precaution, personnel working outside at night are urged to cover the exposed surfaces of their bodies with a mosquito repellant compound, such a sitronela oil.

Rough estimates show that of the personnel sent from the United States to work on the highway, about 15 percent to date have contracted malaria. However, no deaths have resulted and most of the men have been ill but a few days.

Medical care for workers

All men sent to Central America from the United States are vaccinated for typhoid fever, smallpox and tetanus fever. On the highway, facilities for giving yellow fever vaccinations are always available should an outbreak of this disease occur. In addition, immunization of many of the local laborers for typhoid fever, and perhaps smallpox, is planned. Like-

At most labor camps repair shops are provided. At this mountain camp in southern Costa Rica a sawmill, identified by smoke at left, was installed.



Lack of steel hoops inspired the design of this square water tank at a U. S. Engineer camp in northern Costa Rica. (Right) To eliminate the danger of amoebic dysentery, all drinking water for the labor camps is treated either by boiling or with combination chlorination and filtration units developed specially for the U. S. Army field forces.

wise, members of the U. S. Army medical staff along the entire route are instructed to help the local doctors immunize the entire population in those towns where necessary. For example, at San Isidro, Costa Rica, the entire community was vaccinated for smallpox. Work of this type is done in collaboration with the health and sanitation division of the Office of the Coordinator of Inter-American Affairs.

Another medical safeguard is to provide good hospitalization facilities. In each of the larger camps an infirmary of five to ten bed capacity is constructed, and at a few of the larger camps 25-bed hospitals are available.

In some camps the infirmaries are staffed with a doctor from the U. S. Army Medical Corps, and in other cases with only a nurse or a hospital attendant, depending upon the size of the camp.

Still another safeguard is to make available anti-venum for snake bite for all workmen. A good generalized serum effective for all but a few poisonous snakes is provided.

Directing Inter-American operations

Maj. Gen. Eugene Reybold, Chief of Engineers, U. S. Army, is in general charge for the War Department, and Col. Edwin C. Kelton is director of all the War Department work on the highway.

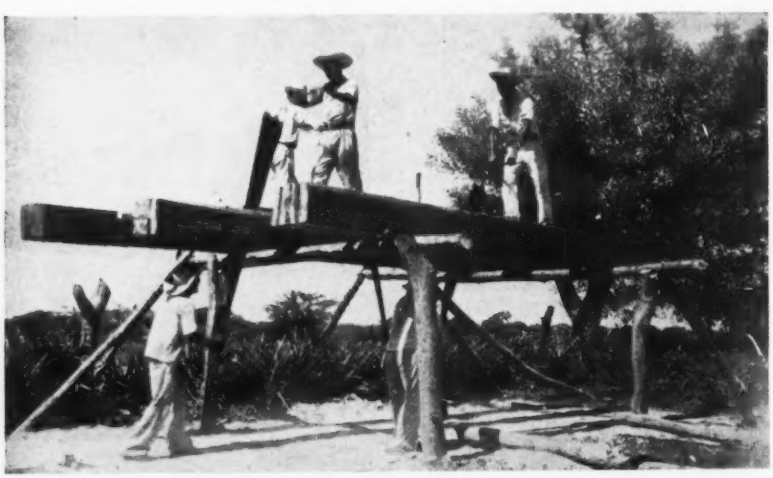
Maj. F. S. McNamara is deputy director for the U. S. Engineers; Maj. Harold E. Spickard, head of the engineering division at Los Angeles; Lt. Col. W. W. Zass, in charge of the Managua office, and Maj. M. N. Thompson, area engineer at San Jose. At Managua Capt. C. V. Kane is head of the engineering division, and Maj. R. J. Allan holds a similar position at San Jose.

Field operations are supervised by: Maj. Maurice C. Tobin, Guatemala; Capt. George H. Barton, El Salvador; Maj. J. A. McEachern, northern Nicaragua and Honduras; Maj. W. A. Ford, southern Nicaragua; Capt. H. J. Yount, northern Costa Rica; and Capt. F. K. Mittry, southern Costa Rica and Panama. Col. Earle T. Norman is medical director on the work.

Commissioner Thomas H. MacDonald is in general charge for the Public Roads Administration, and E. W. James, chief of the Inter-American regional office, has direct supervision of the PRA work. In the San Jose office, which supervises construction in Costa Rica, M. L. Harshberger is resident engineer, Glenn I. Gibbs, office engineer, and Norman B. Wood, field engineer. R. C. Gibson is supervising the PRA bridge work throughout the length of the highway.

Resident PRA engineers in the other countries are: Nicaragua, Milton J. Adams; El Salvador, W. C. A. Palmer; and Honduras, W. H. Schwiesow.

In charge for the local federal governments are: Guatemala, Col. C. E. Bickford of the Guatemalan Army; El Salvador, Juan P. Camino, director general of highways; Honduras, Salvador Aguirre, national director of highways; Nicaragua, Juan Ig. Gonzalez, minister of the public works department; Costa Rica, Luis Paulino Jimenez, director general of highways; and Panama, Victor Nelson Juliao, highway director in that country.



Lumber for use on the highway is produced locally in large quantities. Some is sawn by hand, as illustrated by these workers in Honduras, but a great deal is produced in saw mills with mechanical power.

[Construction operations on the Inter-American Highway will be described in forthcoming articles. Those articles will include the names of the contractors on the highway and their engineer.]

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7-JM-11

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

AIRPORT IMPROVEMENTS ALEXANDRIA, MINN.

OWNER: Civil Aeronautics Authority, Chicago, Ill.; I. W. Polk, engineer.

PROJECT: Improvements at municipal airport, Alexandria, Minn., involving the preparation of the site; and including paving of two flexible bituminous runways, one 150-ft. wide by 5,700-ft. long, and one 150-ft. wide by 5,400-ft. long. Alternate paving method bids were asked, bituminous or 7-in. concrete.

CONDITIONS: Contractor to furnish all materials and complete work in 150 calendar days. Rail and highway transportation facilities available. Wage rates for skilled labor range from $1.50 to $1.62 per hour; and 60c. is the common rate.

BIDS: Thirteen bids were received on the bituminous paving alternate, ranging from the contract low of $528,571 to $827,353. Thirteen bids were also received March 5, 1943 on the concrete paving, ranging from $751,709 to $1,106,905.

LIST OF BIDDERS:

Schedules I and II (Bituminous Paving)

1. Megarry Brothers, St. Cloud, Minn. (contract) $528,571
2. DeRuyter Bros. & Thornton Bros., St. Paul, Minn 590,331
3. A. W. Gallagher & Son & Assoc., Madison, Wis 630,022
4. Suburban Oil Co., Oak Park, Ill 635,465
5. Z. G. Arnold, Inc., Camp Douglas, Wis 651,665
6. Dominick Bros., Gilchrist, and J. P. Berghuis, Olivia, Minn. 665,784
7. Albert Lalonde Co., Sidney, Mont 671,778
8. Fielding & Shepley, Inc., St. Paul, Minn 714,790
9. J. L. McLaughlin, Great Falls, Mont 734,826
10. S. J. Groves & Sons Co., Minneapolis, Minn 736,528
11. Lowe Construction Co., Cedar Rapids, Iowa 790,662
12. Carl H. Peterson & Co., Minneapolis, Minn 800,389
13. Jay W. Craig Co., Minneapolis, Minn 827,353

Schedules I and II (Concrete Paving)

1. Hallett Construction Co., Crosby, Minn $751,709
2. Nelson, Mullen & Webster, Inc., Minneapolis, Minn. 781,791
3. Nelson & Hafner, Contractors, Duluth, Minn 854,637
4. Anderson Bros. & Co., Minneapolis, Minn 884,555
5. DeRuyter Bros. & Thornton Bros., St. Paul, Minn .. 893,454
6. J. A. Ross & Co., Chicago, Ill 895,773
7. S. J. Groves & Sons Co., Minneapolis, Minn 900,610
8. Z. G. Arnold, Inc., Camp Douglas, Wis 921,439
9. Lowe Construction Co., Cedar Rapids, Iowa 948,710
10. Fielding & Shepley, Inc., St. Paul, Minn 969,712
11. Albert Lalonde Co., Sidney, Mont 994,920
12. Stuparits & Balog, Chicago, Ill 1,087,235
13. Western Contracting Corp., Sioux City, Iowa 1,106,905

Schedule I—Preparation of Site

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing of trees	700 in. dia.	$0.25	$0.45	$0.60
2. Grubbing of stumps	700 in. dia.	.25	.60	.60
3. Remove existing fence	1,500 rd.	.35	.15	.50
4. Remove lighting system	Lump Sum	750.00	950.00	2,600.00
5. Remove strawpiles	2 ea.	15.00	25.00	50.00
6. Remove road culvert	Lump Sum	20.00	50.00	125.00
7. Grading	977,700 c. y.	.22	.27	.25
8. Watering earth embankment	10,000 M gal.	2.00	2.00	2.50
9. 12-in pipe drains, storm sewers	2,195 l. f.	1.75	2.00	2.16
10. 18-in pipe drains, storm sewers	1,723 l. f.	2.75	3.00	3.72
11. 21-in. pipe drains, storm sewers	600 l. f.	3.60	4.00	4.25
12. Concrete for inlets, headwalls, etc.	29 c. y.	40.00	50.00	50.00
13. Reinf. steel, drainage structure	22 lb.	.15	.10	.20
14. 30-in. conc. grate bar unit, etc	96 ea.	5.00	3.00	2.15
15. Sumps, in place	5 ea.	150.00	150.00	120.00
16. Fertilizing	190 ac.	8.00	6.00	10.00
17. Seeding	400 ac.	10.00	15.00	35.00
18. Wire electric fence	1,300 rod	1.50	1.65	1.65
19. Wood cattle guard	1 ea.	200.00	200.00	250.00
20. Remove boundary markers	Lump Sum	300.00	300.00	600.00
21. 3-in. underground cable ducts	3,190 l. f.	1.00	1.50	1.00
22. Driveway and parking area ditch excavation	270 c. y.	.30	.50	.60
23. Driveway and parking area surfacing material	320 c. y.	1.00	1.00	1.00
24. Move and re-establish watch-house	Lump Sum	300.00	700.00	300.00
25. Concrete for watch-house, foundation, sidewalks, etc	17 c. y.	30.00	50.00	50.00
26. Move septic tank and sanitary system	Lump Sum	100.00	300.00	250.00
27. Re-establish water supply	Lump Sum	400.00	500.00	500.00
28. Drilling and casing well	30 l. f.	3.00	4.00	1.50
29. Furn. 4-in. pipe well casing	50 l. f.	1.00	1.50	1.00

Schedule II—Concrete Paving, Alternate A

30. Concrete pavement, 7-in. thick	222,180 s. y.	No Bid	$2.59	No Bid

Schedule II—Bituminous Paving, Alternate B

31. 10-in. stab. gravel base course	222,180 s. y.	.65	.45	.73
32. MC-0 prime coat	88,870 gal.	.11	.11	.12
33. 2-in. compacted hot mix bitum. mat'l., surface course	222,180 s. y.	.25	.48	.42
34. Asphaltic cement, surface course	444,360 gal.	.10	.10	.087
35. RC-2 seal coat	44,400 gal.	.11	.11	.12
36. Sand or chip course	2,200 ton	3.00	3.00	2.50

SEWER TUNNEL, MICHIGAN

OWNER: Oakland County, Michigan; Hubbell, Roth & Clark, Inc., Detroit, consulting engineers.

PROJECT: Construction of concrete tunnel sewer and appurtenances in southeast Oakland County (Southeast Oakland County Sewage Disposal District) to connect with sewer system of the City of Detroit, Mich. Involves construction of 31,575 l.f. of 5½-ft. concrete tunnel sewer; 3,297 l.f. of 2-ft. 8-in. by 4-ft. concrete sewer; alignment holes; manholes; regulator chambers; and pumping station. All concrete to be transit-mixed.

CONDITIONS: Contractor to furnish all materials. Rail and highway transportation facilities available. Wage rates stipulated are: skilled labor, $1.75 per hour; semi-skilled, $1.25 to $1.50; and common, 87½c.

BIDS: Project was divided into four sections, results for three of which are shown in the tabulation below. Bids were originally asked in early 1942, but held up until March, 1943, when it was awarded as noted below.

Section I

LIST OF BIDDERS:

1. Gargaro Co., Inc., Detroit, Mich. (contract) $390,544
2. N. D. Mancini & Square Constr. Co., Baltimore, Md 413,278

Item	Quan.	Unit Prices (1)	(2)
1. 5½-ft. concrete tunnel sewer	11,967 l. f.	$32.00	$34.00
2. Alignment holes	700 l. f.	4.00	4.00
3. Manholes	12 ea.	400.00	300.00

Section II

LIST OF BIDDERS

1. Frank J. Knight Co., Centerline, Mich. (contract) $352,147
2. N. D. Mancini & Square Constr. Co., Baltimore, Md 368,770
3. Gargaro Co., Inc., Detroit, Mich 370,070

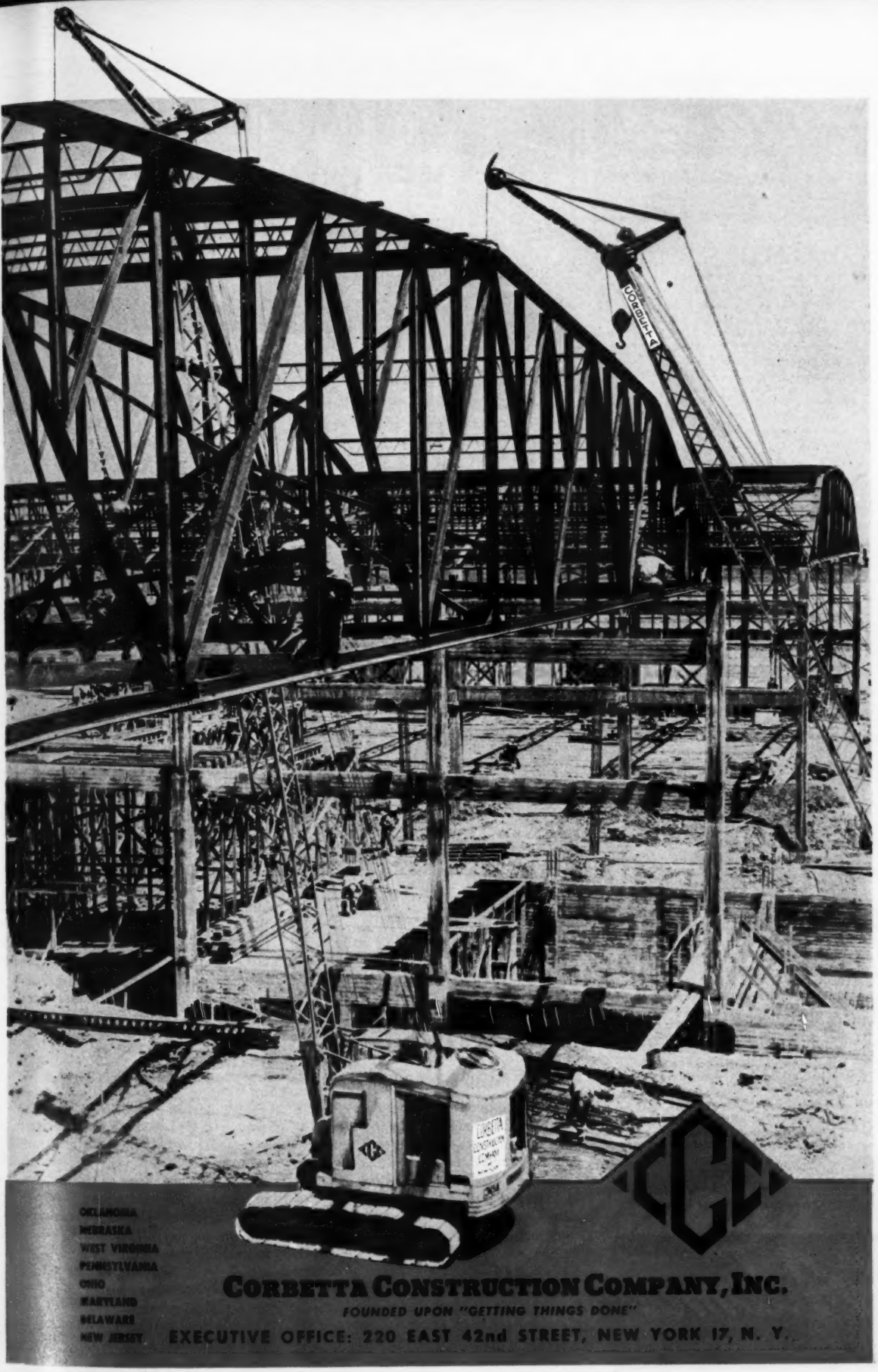
Item	Quan.	Unit Prices (1)	(2)	(3)
1. 5½-ft. concrete tunnel sewer	12,069 l. f.	$28.50	$30.00	$30.00
2. Manholes	13 ea.	360.00	300.00	400.00
3. Alignment holes	700 l. f.	3.00	4.00	4.00

Section III

LIST OF BIDDERS:

1. N. D. Mancini & Square Constr. Co., Baltimore, Md. (contract) $393,960
2. Frank J. Knight Co., Centerline, Mich 402,896

Item	Quan.	Unit Prices (1)	(2)
1. 5½-ft. concrete tunnel sewer	7,539 l. f.	$34.00	$35.00
2. 2' 8" by 4' concrete tunnel sewer	3,297 l. f.	22.00	23.00
3. Manholes	11 ea.	300.00	400.00
4. Alignment holes	700 l. f.	4.00	4.00
5. Regulator chamber, complete	Lump Sum	45,000.00	44,000
6. Regulator chamber, complete	Lump Sum	14,000.00	12,000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IND.... Indianapolis—J. D. Adams Company
Newburgh—Matt W. Foster
IOWA.. Des Moines—Herman M. Brown Company
KANS.. Wichita—S. H. Denney Road Machinery Co.
KY..... Louisville—Brandeis Machinery & Supply Co.
LA..... Baton Rouge—Industrial Tractor & Equip. Co., Inc.
MAINE. Portland—Maine Truck-Tractor Co.
MD..... Baltimore—Paving Supply & Equipment Co.
MASS.. Newton Highlands—Tractors, Inc.
MICH.. Bark River—Bark River Bridge & Culvert Co.
Detroit & Grand Rapids—J. D. Adams Company
MINN.. Minneapolis & Duluth—Thorman W. Rosholt Co.
MISS.. Jackson—Mississippi Road Supply Co.
MO..... St. Louis—Missouri-Illinois Tractor & Equip. Co.
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MONT. Billings—Industrial Equipment Company
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NEV.... Reno—Allied Equipment, Inc.
N. H.... Chester—R. C. Hazelton Co.
N. J..... Trenton—Roos, Young, Dilts Corp.
N. M.... Albuquerque—McChesney-Rand Equip. Co., Inc.
N. Y..... Groton—Clapp Machinery Company
Buffalo—Dow & Company, Inc.
Brooklyn—Edward Ehrbar, Inc.
Long Island—George Malvese & Co.
Albany—Slade Tractor Co., Inc.
N. C.... Raleigh—J. B. Hunt & Sons
N. D.... Fargo—Myhra Equipment Company
OHIO... Cleveland—Gibson-Stewart Company
Cincinnati—H. P. Kelly Equipment Co.
Cambridge—C. E. Major
OKLA... Tulsa & Guthrie—C. L. Boyd Company, Inc.
ORE.... Portland & Eugene—Howard-Cooper Corporation
PA..... Butler—National Culvert & Equipment Co.
Pittsburgh—Russell Pipe & Foundry Company
Camp Hill—L. B. Smith, Inc.
R. I..... Providence—Tractors, Inc.
S. C.... Columbia—N. H. Summers Road Machinery Co.
S. D.... Sioux Falls—Empire Equipment Company
TENN.. Knoxville—Brooks Equipment & Mfg. Co.
Nashville—Industrial Tractor & Equipment Co., Inc.
Memphis—Road Builders Equipment Co.
TEXAS.. Dallas & Houston—Browning-Ferris Machinery Co.
San Antonio—Jess McNeel Machinery Co.
Plainview—Plains Machinery Company
UTAH... Salt Lake City—The Lang Company
VT..... Montpelier—Vermont Road Equipment Co.
VA..... Richmond—Municipal Sales Company
Roanoke—Roanoke Tractor & Equipment Corp.
WASH.. Spokane, Seattle, Walla Walla—
Howard-Cooper Corporation
W. VA.. Charleston—Charleston Tractor & Equipment Corp.
WIS.... Eau Claire—Bark River Bridge & Culvert Co.

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AD ON OPPOSITE PAGE

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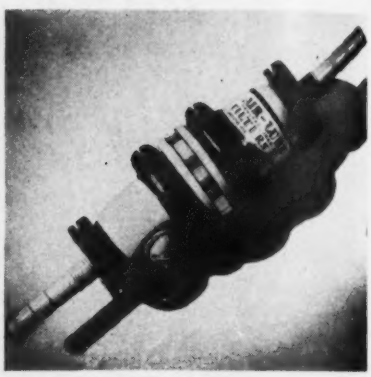
A new line of heavy-duty high temperature pipe coverings and block insulation has been brought into production. It is basic-bonded, vermiculite body for service at temperatures below 2,000 deg. F. It is an extrusion product, cured and processed at high speed and in extremely short cycles. Among the advantages claimed for this product are high insulating efficiency, freedom from shrinkage in service, adequate strength, unharmed by water, accurate measurements and a unique corrugated inner wall surface which provides an air film between the hot pipe and the body of its covering.—*Munn and Steele, Inc., 130 Lister Ave., Newark, N. J.*

Lifting Magnets

This manufacturer announces a new line of lifting magnets to supplement its present magnetic separators, suspended magnets and rectangular lifting magnets. Features of the circular lifting magnets include renewable pole shoes of selected alloy steel, ribbed coil shield, unicoil construction, heat dissipation, better coil weight support to hold coil securely, leads and terminals fully protected against damage and shock, readily accessible for inspection without disturbing the insulation which is permanently sealed. Windings are vacuum impregnated to eliminate the possibility of electrical trouble. The construction is waterproof. — *Stearns Magnetic Mfg. Co., Milwaukee, Wis.*



Automatic Lubricator

An exceptionally light-weight lubricator for use with pneumatic tools is said to eliminate need for frequent oiling, and to prevent freezing, by feeding a regulated oil mist into the tools. The oil is fed only when the tool is operating. An automatic shut-off prevents flooding, and the two standard oil-feed settings are tamper-proof. An oil reservoir holds more than a week's supply, visible through a lucite window. Installed in a hose, the lubricator eliminates deterioration of the rubber.—*Filters, Inc., 1515 Gardena Ave., Glendale, Calif.*

Payroll Form Folder

This device, which, according to a recent survey, saves over 61 percent of man-hours in payroll departments, is now made entirely of wood. The new design is also said to make possible many improvements in operation. Through its use employees' checks or cash payroll statements, payroll summary sheets, and individual earnings records—source material from which government reports are compiled—are posted at the same time. This procedure, involving three simultaneous postings, obviates the necessity of individual postings.—*The Todd Co., Inc., Rochester, N. Y.*

DURABILITY

TO KEEP YOUR GRADERS ROLLING FOR VICTORY...

- ✓ Check condition of engine regularly.
- ✓ Change lubricating oil and renew filter elements every 100 hours of use.
- ✓ Lubricate all parts of grader regularly.
- ✓ Service air cleaner every 10 hours of use.
- ✓ Clean fuel oil filters at least every 60 hours.
- ✓ Don't ride clutch. Adjust clutch pedal when and as needed.
- ✓ Keep electrical system in good condition —check battery regularly.
- ✓ Keep lost motion out of grader—use adjustments for wear and replace parts worn out.
- ✓ Keep tires inflated to recommended pressure.

If you need help or advice on any of the above, see your local Adams distributor.

JUST AS MODERN TANKS are built to take the terrific battering of front line warfare, so Adams Motor Graders are built to withstand the severe shocks and stresses of carving roads, airfields and naval bases out of all kinds of terrain in all parts of the world . . . Whether in the frozen tundra of Alaska, the rocky hills of Tunisia or the dense jungles of New Guinea, Adams machines keep hard at work with minimum attention . . . DURABILITY is but one of the many Adams features you'll want to consider when choosing equipment for your post-war jobs!

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Adams motor graders, leaning wheel graders, elevating graders, hauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.

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★ FINISH HEAVY CONSTRUCTION FASTER

Cutting Heavy Timber with Pneumatic Model

with Mall CHAINSAWS

5 H.P. MALL Gasoline Engine Chain Saw 36" Capacity. Also available in 24" and 48" sizes.

Cut Heavy Timber and Piling in a fraction of the Time Required by Hand.

● **8 Features that Save Time and Labor**

1. Automatic clutch prevents stalling the engine when saw is pinched or forced too hard. Eliminates hand clutch control. Only necessary for operator to manipulate engine throttle when ready to cut.
2. Cuts piling to within 2 inches of the ground.
3. Easy starting gasoline engine.
4. 360° index permits horizontal, vertical, or any angle cuts.
5. Safety guard on all models.
6. Electric or gasoline engine chain saw sharpeners available for sharpening chains in shop or field.
7. Easily carried anywhere on the job.
8. Provides saw mill performance in remote areas.

●

Literature and Prices Mailed upon Request.

●

MALL TOOL COMPANY
7730 SOUTH CHICAGO AVE.
CHICAGO • ILLINOIS

MANUFACTURERS' ACTIVITIES

HENRY H. HOWARD is returning from a wartime post with the U. S. Ordnance Department to become general sales manager of Caterpillar Tractor Co., Peoria, Ill. He has been associated with the company since 1926, and last year was called for temporary emergency duty as consultant to Brig. Gen. J. K. Christmas, of the Tank and Combat Vehicle Division of the Ordnance Department. A graduate of the University of California, Mr. Howard first worked for the company in the parts department and later in the export offices of the company's San Leandro, Calif., plant. He spent three years in Australia as export representative and after his return to this country advanced steadily to the position of manager of engine sales in 1937.

THE APPOINTMENT of Wallace W. Leipner as acting chief engineer of the American Welding and Manufacturing Co., Warren, Ohio, has been announced. Mr. Leipner attended Case School of Applied Science and has been active in engineering work for 20 years. He is a member of the Cleveland Society of Professional Engineers, the Ohio Society and the National Society of Professional Engineers and also the Society of American Military Engineers. He was formerly associated with Porcelain Steels, Inc., The H. K. Ferguson Co., and The Austin Co.

ALBERT S. GLOSSBRENNER has been appointed general superintendent of the Youngstown Sheet and Tube Co., succeeding J. L. Mauthe who became vice-president recently. Glossbrenner was superintendent of the Sheet and Tube Co.'s Brier Hill plant.

PROMOTION of two executives of Koppers Co., American Hammered Piston Ring Div., has been announced. E. A. Koether, works manager since 1936, becomes technical assistant to the vice-

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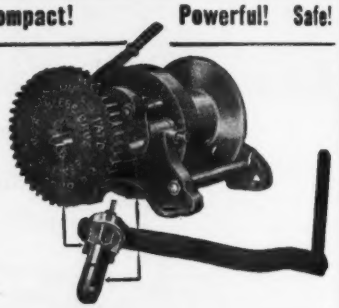
Compact! Powerful! Safe!



DISTRIBUTABLE CONTROLLED POWER
with Beebe Bros. ALL STEEL HAND HOIST
SEATTLE, U.S.A.

Money Has Been Saved on These Jobs
1200' assembled pipe (132 Tons) were lowered to bed of Mississippi at St. Paul with 9—5-Ton Beebes, three lines to each hoist through blocks.
Hudson River Bridge sidewalks were laid in sections with 32—5-Ton Beebes.
Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

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When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

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"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD"

president. This is a newly-created position in which he will concern himself mainly with post-war planning. Edgar S. Freeman, Jr., assistant sales manager, takes over Mr. Koether's duties as works manager. All engineering problems will clear through Mr. Koether.

BUFORD M. STUBBLEFIELD has been appointed superintendent of the Brier Hill Works of the Youngstown Sheet & Tube Co., succeeding A. S. Glossbrenner who is now general superintendent of the Youngstown district plant. He was graduated from the University of Illinois in 1915. In 1916 he started to work for the Youngstown Sheet & Tube Co., at the Campbell Works. In 1923 he became assistant superintendent of the coke plant, and in March, 1929, he was made superintendent of the coke plant and blast furnace at the Campbell Works.

E. NUBER has been appointed manager of the Pacific Coast branch offices and factory of the Bristol Co., Waterbury, Conn. He was associated with the New York Edison Co. for six years in their general test and engineering department. He was later associated with the Western Electric Co. as production engineer, and also spent several years with the Board of Transportation in New York City. Mr. Nuber will make his headquarters at the company's branch offices at 40 Berry St., San Francisco, Calif.

WILLARD A. LULI, engineer with the Cooper-Bessemer Corp. for the past eight years, has been promoted to the post of factory production representative for the company's two plants at Mount Vernon, Ohio, and Grove City, Pa. In his new assignment, Luli is affiliated with the company's Washington, D. C., office where he serves as Cooper-Bessemer representative on the War Production Board for the large diesel engine manufacturers' planning and scheduling committee. Luli's principal duty will be allocation of materials needed by Cooper-Bessemer in their all-out war production.

WRITE *now* FOR THIS HANDY BOOK OF PUMP *facts*

- **PUMP DATA**

Complete specifications and performance data on every Carver *Certified* Pump model from 3,000 to 125,000 GPH, with plenty of illustrations.

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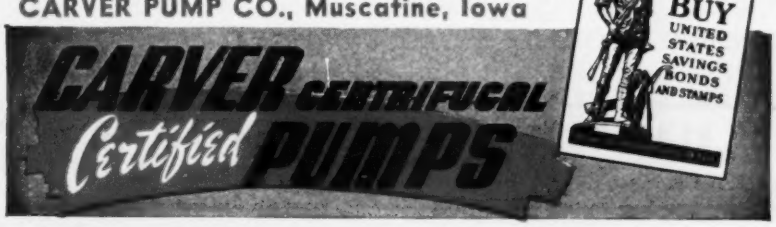

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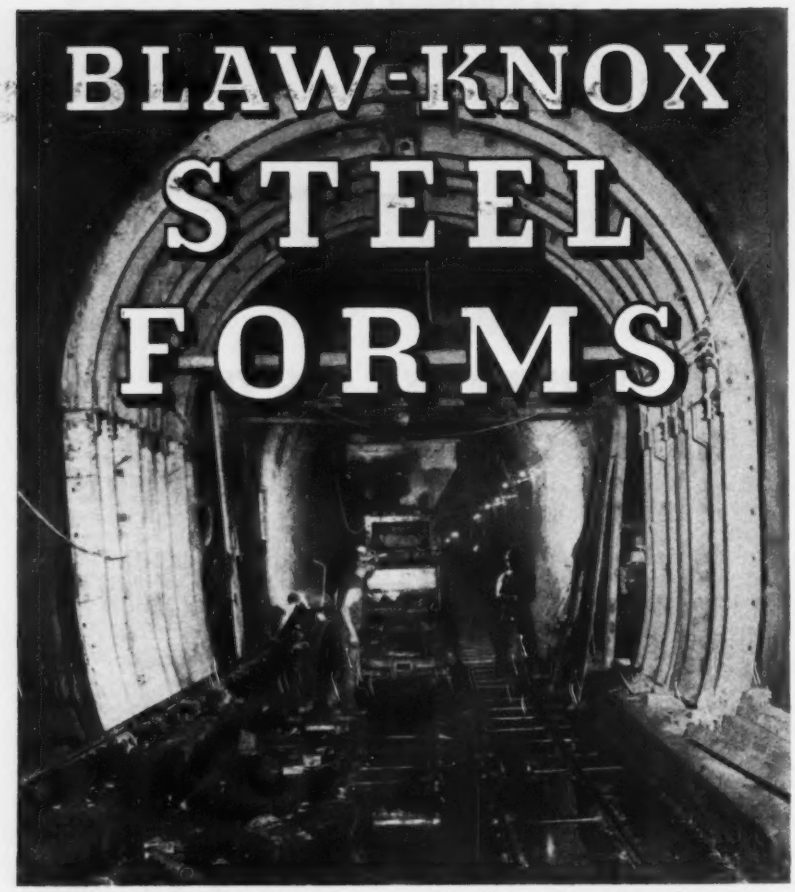
Blaw-Knox Steel Forms are designed for speed and economy in construction, and contractors have for many years utilized our specialized engineering service to plan their jobs.

Current construction work of a sufficiently urgent nature can be served, and long range planning for the proper handling of future jobs can be aided by experienced Blaw-Knox engineers.

The engineering facilities and services extended by Blaw-Knox form engineers are prized by all who have taken advantage of them. This service is offered in the interest of engineering progress and is free from any charge or obligation.



BLAW-KNOX STEEL FORMS are used for the construction of
TUNNELS WALLS SEWERS DAMS BRIDGES PIERS
CONDUITS ROADS SEWAGE DISPOSAL PLANTS . . .
. . . and other varieties of concrete construction

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2001 FARMERS BANK BUILDING PITTSBURGH, PA.
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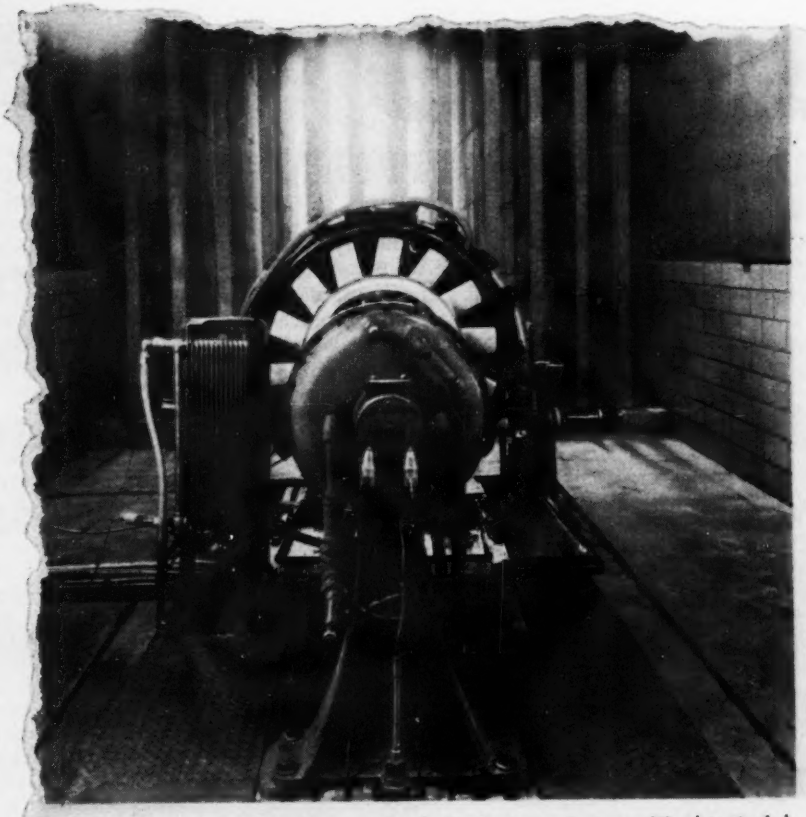
Air and Gas Compressors—Over half a century of experience in the manufacture of air and gas compressors of all types and sizes, plus a vast fund of information containing performance reports on installations make up the background for this booklet which is entitled "Plain Talks on Air and Gas Compressors." It is part of a series and this section contains five chapters on compression efficiency relative to heat and compression; compression efficiency as affected by valves; effective volumetric and horsepower; mechanical efficiency; and direct-connected motor-driven compressors.—*Worthington Pump & Machinery Corp., Harrison, N. J.*

New Fire Hydrant—Water department superintendents, fire chiefs and municipal officials will be interested in a folder describing a new fire hydrant. It concisely outlines the design of the equipment, and sectional views show the construction of the entire hydrant, and there is an enlarged illustration of the safety breakable section which it is claimed can be replaced within a half hour. A complete parts list and dimensions are also included.—*Kennedy Valve Mfg. Co., Elmira, N. Y.*

Roller Bearing Jaw Crushers—The complete line of this manufacturer is presented in a new 8½ x 11-in. 8-page bulletin. All features of construction and operation of the machinery are clearly illustrated and completely explained. The bulletin gives a very comprehensive conception of detailed design and performance. Operational data, specifications and dimensions are provided and arranged for easy reference.—*The Austin-Western Road Machinery Co., Aurora, Ill.*

Marine Boilers—This manufacturer has just published a 40-page booklet on marine boilers in which is included engineering data of interest to naval officers, chief engineers, marine superintendents and port engineers.

There are sections on physical properties and fuel oils, and specimen analyses of typical coals produced in fields which supply seaboard and lake areas, and also authoritative tables on the properties of steam.—*Babcock & Wilcox Co., 85 Liberty St., New York, N. Y.*



***Contents in Brief**—Despite use of substitutes to conserve critical materials, a record in sound reduction (98.5 percent between test cells and control room) is claimed for a low-cost building designed expressly to reduce noise made by high-speed gasoline engines while being "run-in" on test blocks.*

A correction

Fiberglas White Wool is immediately available for Engine Test Cells*

DUE TO a misunderstanding of the facts concerning the availability of Fiberglas Insulating Wool, an article appeared in this magazine last month which stated that

"Specifications as originally written provided that sound insulation should consist of perforated metal with baked enamel finish, backed by glass fiber.

"However, *these are critical materials . . .*"

This statement, as it relates to "glass fibers" is definitely in error. For, Fiberglas Insulating Wool is not a critical material. On the contrary, in the form used for sound reduction in engine test cells it is quickly available.

This fact is important because, as the article states, "the calculated absorption of 25.8 decibels" attributed to a Fiberglas-and-perforated-metal installation is substantially above that obtained with the substitute insulation.

Fiberglas Insulating Wool comes in bats or long rolls. It is usually installed at a density of 4 lbs. per cubic foot. Should metal continue to be critical, perforated asbestos board can be substituted and used with Fiberglas Insulating Wool without sacrificing sound reduction efficiency.

The Fiberglas line of Industrial Insulations includes insulating board, block, metal-mesh blankets, rigid and flexible pipe insulation, finishing and insulating cements.

For full technical data and application information write *Owens-Corning Fiberglas Corporation, Toledo, Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.*

FIBERGLAS*
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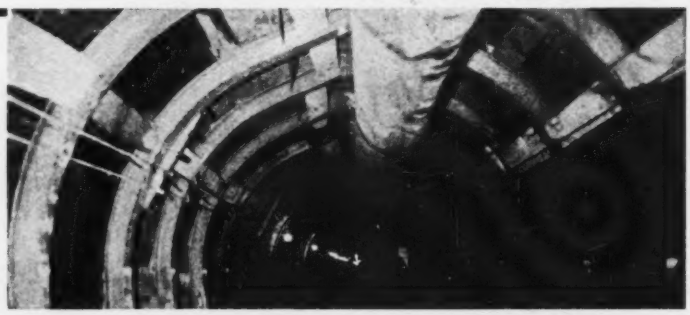
● Eliminate cumbersome timbering . . . hold excavations to a minmum . . . save time, manpower and money with COMMERCIAL Liner Plates! COMMERCIAL Plates are made to your specifications—exact radius or combination of radii . . . a type and size for every tunneling project. Their application to your next tunneling job will prove their value! Illustrated informative literature is available . . . write for it today!



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YOUNGSTOWN 1, OHIO

WYTEFACE "A"

TRADE MARK

STEEL TAPES

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Easy-to-read, *raised* black graduations on crack-proof white surface . . . resist abrasion from rock, sand, scraping over rails, pipe, concrete, etc. In all sizes and types—in cases or reels. Ask your dealer—or write for catalog.

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MEN AND JOBS

Col. E. J. Thomas is the new head of the district office of the United States Engineers in San Francisco, Calif. Colonel Thomas who has been supervising a $165,000,000 construction program in the Rocky Mountain region, with headquarters at Salt Lake City, began his military career as a volunteer in the Spanish-American War. He succeeds Colonel James D. Andrews, Jr., now assigned to engineer construction units.

Henry A. Yancey, resigned as city manager of Durham, N. C., July 7, to accept a similar post at Greensboro, effective September 1. Yancey has served as city manager at Durham since 1935.

Captain Fred C. Hensley, executive officer of the Army Area Engineer's office at Charlotte, N. C., has been assigned to duty with the Contracts Renegotiation Board of the Fourth Service Command, Atlanta, Ga.

Francis J. Perna, plans and training officer of the 52nd Engineer Combat Battalion at Camp Butner, N. C., has just been promoted to the rank of Captain.

Thomas Edwards of Roseburg, Ore., has taken over the duties of district maintenance superintendent of the State Highway Department, with headquarters at Klamath Falls. He succeeds George Sothman, who is in the army engineers.

Charles H. Buckius has become chief engineer of the Pennsylvania Highway Department, succeeding Thomas C. Frame who retired after 31 years' service.

E. Warren Bowden, formerly associated with Parsons, Klapp, Brinckerhoff & Douglas, consulting engineers of New York, has been named assistant to the president, Walter Kidde Constructors, Inc., Belleville, N. J., industrial engineers and builders. Mr. Bowden will fill the vacancy created by the promotion of William Collins to be president of the organization following the death of Mr. Kidde.

Lt.-Col. A. A. Larson has been reassigned as area engineer for the Baxter Springs Area in Missouri. This includes new construction work in southeastern Kansas and southwestern Missouri.

M. G. Spangler, who was research associate professor of civil engineering and J. P. Lawler, assistant professor of sanitary engineering at Iowa State College, Ames, Iowa, recently accepted commission as Lieutenant-Commander, Civil Engineering Corps, United States Naval Reserve.

WOOD ROADMIXERS build top-quality paving faster, with less equipment, less manpower and at less cost than any other method of pavement construction!

HERE'S WHY

In the first place, the Wood Roadmixer is a complete traveling mixing plant. It is powered and pulled by a standard crawler tractor and tows a liquid binder supply truck. That's all the equipment needed to put down an airport, a landing field, a road or a highway. This means less equipment tied up, simplified operations —and ***speed!***

Second, on an average paving job with a Wood Roadmixer, two men can handle the entire operation. This cuts labor costs to a minimum and releases much needed manpower for other urgent jobs.

Third, records on completed projects, or on work now under construction in the United States and abroad, show savings as high as one-third in costs. Much of this paving was laid under conditions too difficult for other methods to handle.

These are facts that operators of Wood Roadmixers are proving every day.

Engineers and Contractors with an eye on the taxpayer's pocketbook as well as their own are turning to Wood Roadmixers—the leading traveling plant method of rapid, low-cost asphaltic pavement construction.

➡ ➡ ➡ *DESIGN FOR* ROAD-MIX

Write for detailed and illustrated Wood Roadmixer bulletin, "The Fastest Method of Low-Cost Paving."

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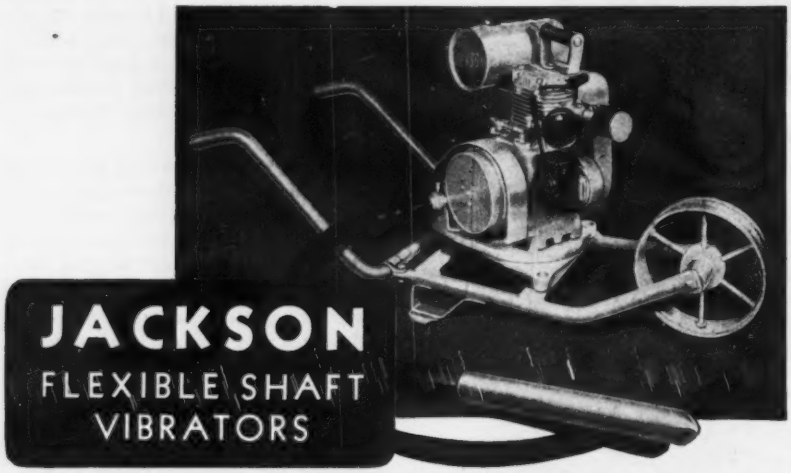
The employees and management of Chas. F. Vachris, Inc., are honored to announce that the Army-Navy "E" Production Award for Great Accomplishment in War Construction was presented July 15 at the Port Johnson Construction Project, Bayonne, N. J.

PHILADELPHIA NEW YORK BALTIMORE



. . . are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

Supplied with a 2⅝" and a 1¾" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.

Write, wire or telephone for further information

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON, MICHIGAN

NEWS OF THE WEEK

(Continued from p. 59)

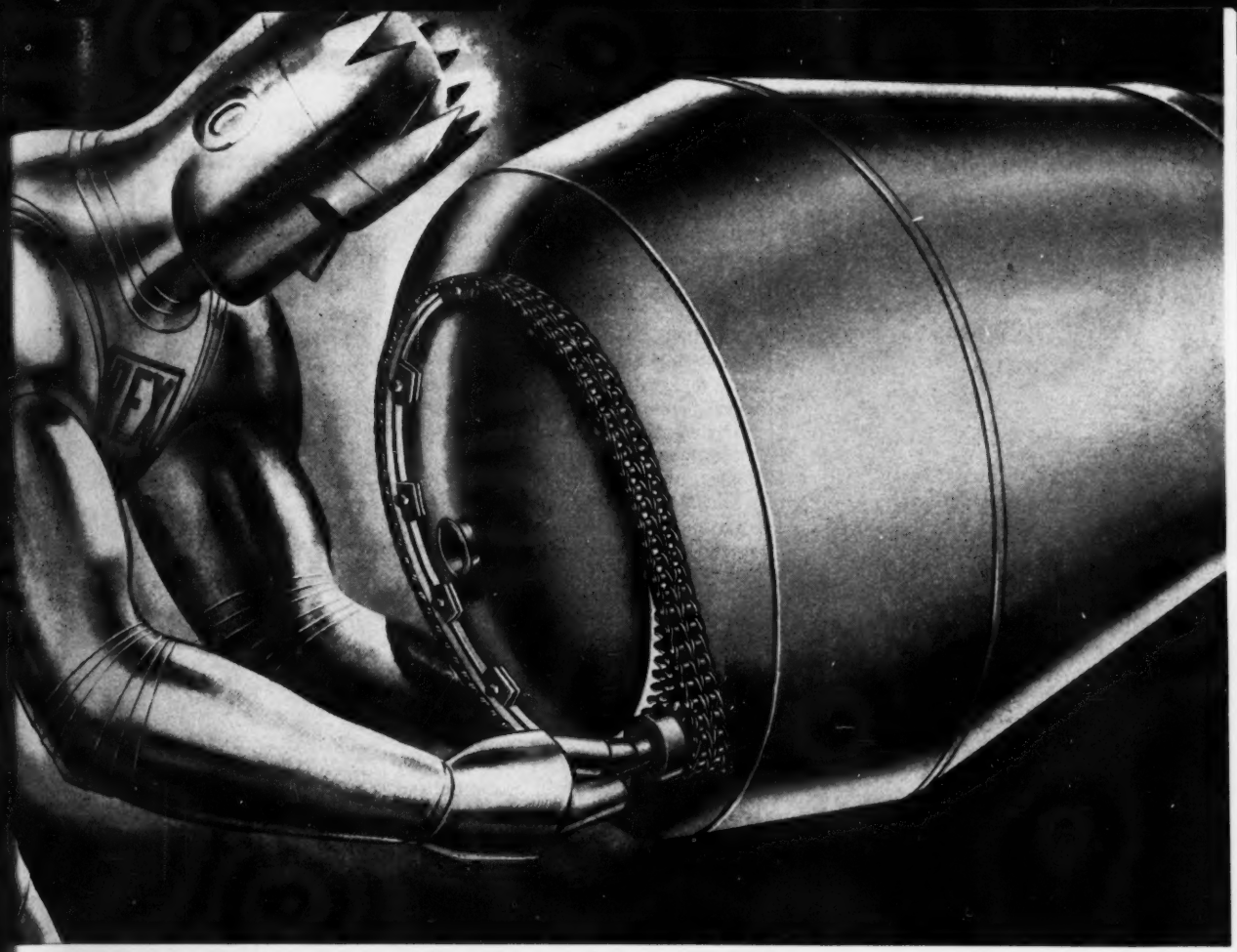
Painting and redecoration of 200 homes for Wartime Housing, Ltd., is now being completed in Victoria, B. C. by Industrial Painters. One hundred of the new homes were in connection with the James Bay development at Victoria, and the company also completed two staff houses and a mess hall in connection with the Esquimalt Wartime Housing. The company previously supervised $250,000 worth of painting on national defense work in Alberta.

Governor Raymond E. Baldwin of Connecticut signed the new highway funds allocation act recently. The law, adopted after long debate in the general assembly, abolishes the $1,000,000 state aid road fund and adds $1,000,000 to the existing $3,000,000 annual dirt road fund to be divided equally among various towns. It provides that towns now having accumulated state aid fund credits or towns which have planned state aid for work may receive grants under the state aid formula in small amounts over a period of ten years.

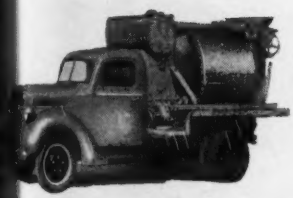
Superintendent D. M. Williams of the Durham, N. C., City Water Department, has requested the Durham City Council to include an appropriation of $4,000 in the department budget for 1943-44 for a pitometer survey to determine the present adequacy and future needs of the department. To be covered by the survey would be a study of population increases in various sections of the city; fire protection and water consumption needs for the next 25 years; the loss of head and friction in the trunk lines; an investigation of various points of the system where the present facilities seem inadequate to determine whether replacements, extension or cleaning of the mains is required.

Col. W. W. Wanamaker, district engineer, has announced that the Denison, Tex., district army engineers have sufficient funds with which to complete all except two minor features of the $50,000,000 Denison Dam. These two will be delayed until after the war—relocation of a main highway and installation of a second generator unit in the power house.

That the huge Gilbertsville Dam, TVA's Kentucky power project on the lower reaches of the Tennessee River, is nearing completion was shown recently in the announcement of reservoir-filling preparations. TVA said that to pave the way for collecting water the Eggner's



HE CUSHIONS ROAD SHOCKS *with his Flexible Drive . . .*



Truck mixers, rolling along the road, pick up drum vibrations and shocks. These shocks, if transmitted to costly transmissions, power nts and other vital working parts, cause damaging in and excessive maintenance.

Knowing this, Rex Mechanical Engineering—Rex M. E. esigned his Moto-Mixer with the exclusive flexible in belt drive—the sturdiest drive in the industry. Be- se this chain drive goes completely around the drum, because of the inherent shock absorbent ability of in belt, each link of the chain absorbs its share of the ck load. This cushions the transmission and other vital rking parts from damaging road and mixing shocks. ere are no unyielding gears and pinions to bind and ate damaging strain as the truck weaves over the road.

ex M. E. has mounted his drive shaft parallel to the of the drum—a direct transmission of power from its source to its application—the most efficient method of transmitting power.

This is but one of the many features which Rex M. E. has incorporated in the design of his Moto-Mixer. Through many years' experience in the design and manufacture of equipment for the mixing, placing and hauling of concrete, Rex M. E. has learned the problem of the contractor and construction engineer. In the building of Rex construction machinery, he has applied that knowledge in the way most helpful to them.

To give you the whole story, Rex M. E. urges you to write Chain Belt Company, 1649 W. Bruce St., Milwaukee 4, Wis., for complete information on his Moto-Mixer.

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Concrete Mixers • Moto-Mixers • Pumpcretes • Pavers
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dependability and performance. No other
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Supplied with a 2⅜" and a 1¾" head.
a vibrator efficient in and suitable for a
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Model FS-6A, illustrated above, is furni
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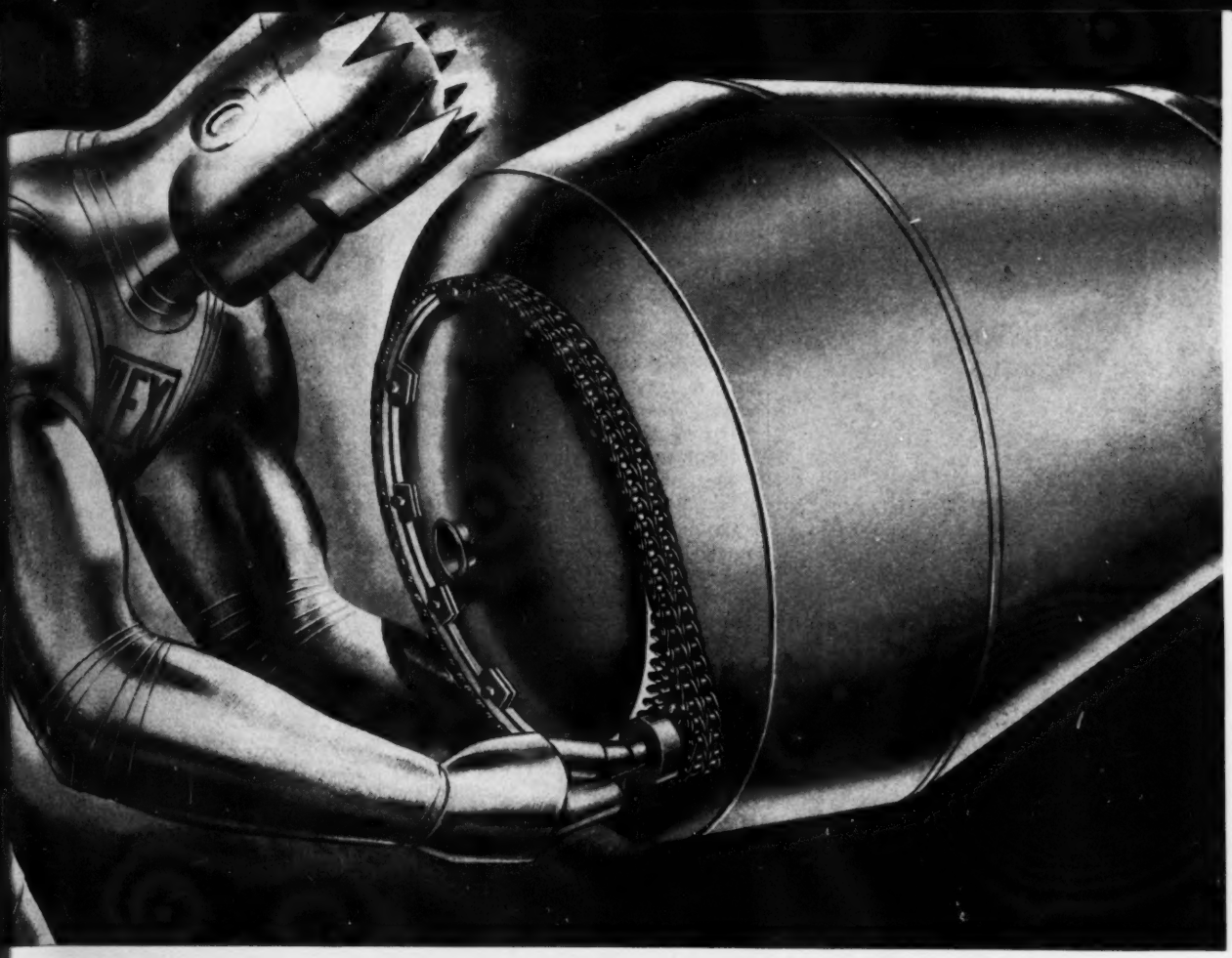

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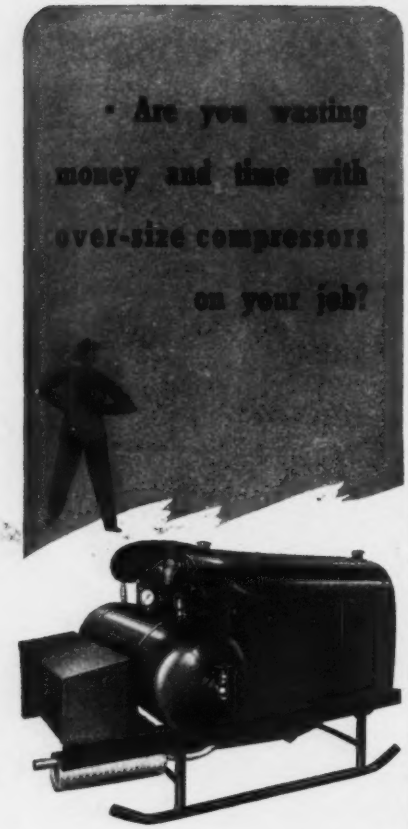
OF MILWAUKEE



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Ferry Bridge, crossing the river on U. S. 68 between Cadiz and Benton, will be closed for five months of raising operations in order to get it out of reach of the higher water level. Ferry service operated by the State Highway Department is to take care of traffic in the meantime.

Enrollment at the University of Texas Engineering School this year will total 1,500 to 1,600, including 540 navy engineering students, Dean W. R. Woolrich estimates. An additional 160 freshmen engineering students were registered for Navy training at the summer semester which opened July 5. A new deferment order now being drafted continues occupational deferment for those engineers who can graduate by July, 1945. The University of Texas likewise has established a combined program of engineering and physics. Electrical engineers can study either pre-radar or electrical machinery and civil engineers either construction or marine engineering.

The Army Specialized Training program of North Carolina State College, Raleigh, N. C., on Aug. 9 will begin classes in advanced engineering for selected soldiers, it has just been announced by Colonel Thomas W. Brown, commandant. Several hundred men are expected to take the courses, and officer personnel is expected to arrive soon to complete plans for the training. Members of the college's civilian faculty will serve as instructors. Colonel Brown said the courses will last a minimum of twelve weeks and will be followed by terms of equal length for soldiers qualified for progressively advanced work.

A resolution authorizing the city service director of Akron, O., to employ a consulting engineer to make a study of the city's sewage disposal plant needs was approved June 25 by the City Council's finance and sewer committees. The technical expert, it was explained, would aid city engineers in drafting plans for immediate repairs and in designing changes needed to handle the future Akron's sewerage. Problems presented by the dumping of wastes into the sewers by synthetic rubber and reclaimed rubber plants needed extensive study, it was said.

The Iron Fireman Manufacturing Co. announced at Portland, Ore., recently that it has received a $21,000,000 contract from the U. S. Maritime Commission for 207 more Liberty ship engines. President T. H. Banfield said the plant is now turning out the engines at the rate of 24 a month under a contract which expires in October. Construction will be stepped up to 27 monthly, he said.

SPEED SPEED SPEED!

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Viber Vibrators are being used on wartime construction because they mean better concrete faster! No matter what type of concrete work you do, there is a type of Viber Vibrator made for that type of work. Interchangeable equipment, for gas, electric and air-operation, still further reduces costs.

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Mercury clutch, entirely automatic, picks up load at 1500 r.p.m. allowing engine to idle without running vibrator, eliminates stalling, makes starting easy in cold weather.

Upsetting is practically eliminated in mounting. Handles allow complete unit to be easily carried.

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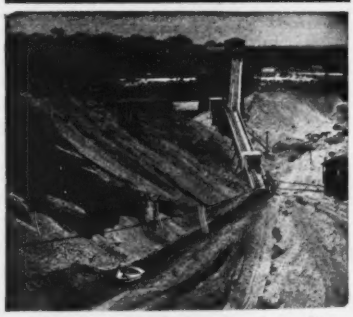

This 2½ cu. yd. Sauerman Drag Scraper digs deep into hill of gravel and moves 1,000 tons of material per day to crusher.

For larger profits on long range excavating and material handling work, use a Sauerman Drag Scraper, Slackline, or Tower Machine. A Sauerman machine is able to span an area 1,000 ft. or more in width and convey materials from any point in this area at a rapid rate. One man handles the entire operation.

Many different jobs—large and small—where materials have been dug, hauled and placed for a few cents per cubic yard are illustrated in the Sauerman Catalog. Write for this book.

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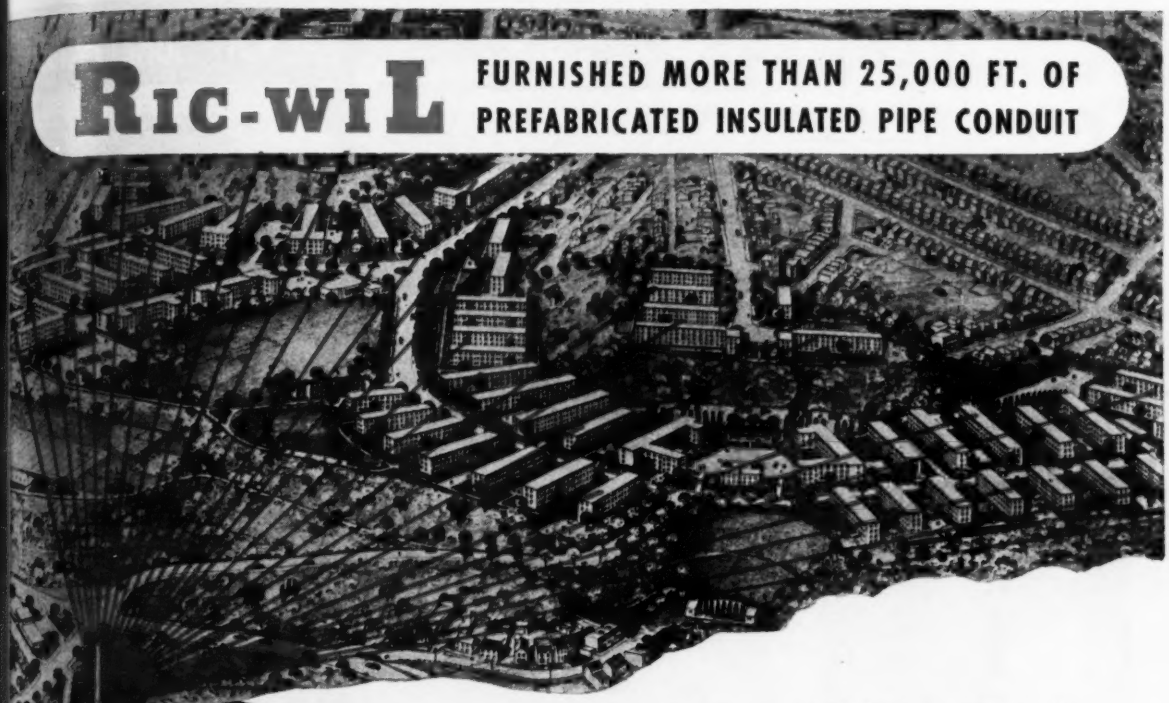

For Terrace Village Housing Unit No. 2 in Pittsburgh

Fuel savings of 15% or better are made possible in this mammoth project by a central heating system. Ric-wiL pre-fabricated pipe units provide the insulation and protection for the entire underground distribution system.

Line of Ric-wiL conduit from anchor to boiler house (top, left). Note shallow, narrow trench.

Installing connector band. All necessary accessories are prefabricated and shipped with order.

A total of 83 buildings, comprising 1851 living suites, are supplied with heat and hot water from a central plant, through an underground distribution system containing over 25,000 lineal feet of Ric-wiL pre-sealed Insulated Pipe Units. High-pressure steam from the plant is piped through Ric-wiL steam conduit to six scattered stations where hot water is generated and circulated through Ric-wiL conduit to all the buildings, for heating and hot water supply. Thus the project realizes the economy of steam, and the temperature control and convenience of hot-water heating.

All conduit was factory pre-fabricated and shipped pre-sealed to the site in convenient lengths. Installation was made in record time, with a minimum of excavation and backfill, saving countless man-hours and interfering little or none with other construction. The system is highly efficient, permanent, and maintenance-free—typical of all Ric-wiL engineered projects.

Ric-wiL Insulated Pipe Units are ideal for hospital, school, industrial or municipal installations of all kinds. Let us show you their advantages on your next construction project.

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MEETINGS

AMERICAN SOCIETY OF CIVIL ENGINEERS, summer meeting, Biltmore Hotel, Los Angeles, Calif., July 28-30.

REGIONAL AND LOCAL MEETINGS

NORTH CAROLINA LEAGUE OF MUNICIPALITIES, annual meeting, Raleigh, N. C., Aug. 12-13.

NEW ENGLAND WATER WORKS ASSOCIATION, Hotel Statler, Boston, Mass., Sept. 28-29.

Elections and Activities

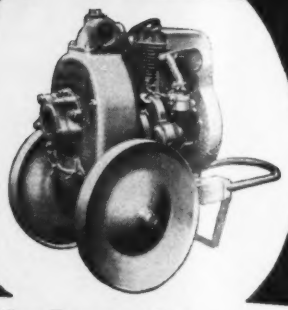
THE UPPER PENINSULA ROAD BULDERS' ASSOCIATION at its recent annual convention at Escanaba, Mich., elected the following officers: President, T. S. Dundon, Luce County highway engineer; vice-president, George DePew, Alger County highway engineer; secretary-treasurer Chauncey Morely, member of the Ontonagon County Road Commission.

LEROY D. SNYDER, bridge contractor of Humboldt, Ia., and a member of the class of 1913, was elected president of the Iowa State College Alumni Association recently. Charles Shirey, a paving contractor of Waterloo, Ia., is filling an unexpired term on the college's athletic council, and Dan Craig, secretary-treasurer of the Hoak Construction Co., Des Moines, has been re-elected to this council.

NORTH CAROLINA TRAFFIC LEAGUE held its 13th Annual Meeting at Raleigh, N. C., on June 29, and elected officers as follows: C. A. Cannon, Concord, re-elected president: L. F. Owen, Winston-Salem, vice-president; W. S. Creighton, Charlotte, secretary-treasurer, and J. T. Ryan, High Point, renamed Chairman of the Board of Governors.

THE ENGINEERING CLUB OF OKLAHOMA CITY recently elected the following officers: Ralph Randall, president; J. W. Rogers, first vice-president; Frank Herrman, second vice-president, and T. E. Graham, secretary-treasurer.

JAEGER "SURE PRIME"



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with up to 5 times faster priming, with hi-head, hi-capacity performance, with thousands of extra hours of trouble-free service.

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Sizes 3000 to over 200,000 G.P.H.

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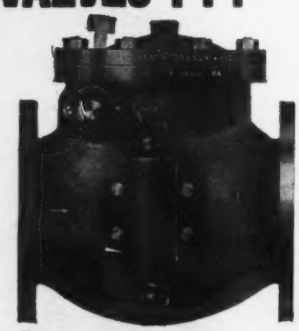
CUSHIONED SWING CHECK VALVES . . .



Designed for balanced operation, the G-A Cushioned Swing Check Valve features a cushion chamber to prevent any slapping or banging of disc on reverse flow. This unit is available in 4" to 36" sizes . . . supplied in materials best suited to your specific needs. Write for your copy of the G-A Catalog today . . . contains complete descriptions of all G-A Valves.

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CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York

ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*

(Daily service also available—Write for details)

WATER SUPPLY

PROPOSED WORK

N. J., Fairlawn—Boro, 1 m.g. emergency steel water storage tank. F. Harley, Fairlawn Ave. and River Rd., engr.

†**N. C., New Bern**—City, L. C. Lawrence, mayor, bids soon imprv. water supply, drilling wells. $398,000. **FWA.**

Tex., Duncanville—Duncanville Water Dist., c/o C. Bell, atty., Dallas water sys. $30,000. Vote soon on bond issue.

Tex., Goose Creek—Tejas Development Co., waterworks, sewage, gas lines for 150 frame type dwelling area, Morrell Park Addn. 2. CD 7/21—ENR 7/29.

Tex., Houston—Ind. School Dist., 1600 Washington Ave., drilling, developing new water supply well, etc. $15,000.

N. B., St. John—Municipality, installing water lines to new housing. $20,000.

BIDS ASKED

Bids Asked August 10

†**Wis., Wood (Waukesha)**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., D. C., reconditioning deep well.

Bids Asked

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, water targets and access waterway, Sol. 359-44-C2, Galveston Co.

LOW BIDDERS

O., Cleveland—City, F. Foy, purch. agt., installing 17,650 ft. 25- to 48-in. concrete water line St. Clair Ave. from London Rd. to E. 222 St., from Curro Constr. Co., Union Commerce Bldg., $197,000. A. G. Levy, Auditorium Bldg., engr. CD 7/9—ENR 7/15.

Wis., Omro—Village, July 15, water distr. sys. Contrs. 1A and 1B, from Advance Constr. & Eng. Co., Hinsdale, Ill., **$19,103**; Contr. 3, pump. station and reservoir, from Kasper Constr. Co., 1213 N. 16 St., Manitowoc, $17,490. CD 6/22—ENR 6/24.

CONTRACTS AWARDED

†**Alabama**—U. S. Eng., Grant St., west of Westwood St., Mobile, water and sewer addns., Calhoun Co., to J. R. Reid Constr. Co., 2109 N. 14 St., Birmingham. Bids 7/15.

†**Georgia**—U. S. Eng., Post Office Bldg., Savannah, water storage tank, Contr. 819-Eng-1603, Houston Co., to Taylor Iron Works & Supply Co., Macon, under **$50,000.**

†**Idaho, Arco**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. well, pump, pumphouse, Naval Proving Ground, NOY 6298, to R. Moss, 4360 Worth St., Los Angeles, Calif., **$17,000.**

†**La., New Orleans**—Sewerage & Water Bd., A. G. Moffat, secy., 50,000 lin. ft. 12 and 16 in. c.i. watermains, booster pump. sta., etc., to Wolfe Bros. Contg. Co., 10 Beverly Gardens Dr., **$270,004. FWA.** Bids 7/14. CD 7/2—ENR 7/8.

Mich., Ypsilanti—Altering WW sys., incl. pump. equip., main extens., to Birmingham Contracting Co., 208 Hanna Bldg., Birmingham, **$17,120.** Shoecraft, Drury & McNamee, Ann Arbor, engrs.

†**Montana**—U. S. Eng., 800 3 Ave., Seattl , 4 Wash., wells, Glacier Co., to W. A. Hale, Cut Bank, under **$50,000.**

†**Montana**—U. S. Eng., 800 Third Ave., Zone 4, pumphouse, Glacier Co., to Dudley Anderson Co., Great Falls, under **$50,000.**

†**Texas**—U. S. Eng., Fort Sam Houston, water, sanitary sewer, gas underground utilities, Bell Co., to L. F. Crockett, 112 Academy Dr., Austin, under **$50,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Conn., Bridgeport—P. Wks. Dpt., making plans storm sewers Old Town Rd. and Main St.; storm and sanitary sewers Railroad Ave. from Brod to Main Sts., Main St. from Railroad to South Ave., South Ave. from Main to Water Sts., Water St., from South Ave. to Congress St. Over $25,000. Henry L. Rowland, City Hall, State St., engr.

†**Conn., Bridgeport**—City, Hy. Com., City Hall, Contr. 5, siphon trunk sewer under Johnson's Creek, Conn. 6-107. **FWA.** Over $25,000. H. L. Rowland, City Hall, engr.

Location of ENR Correspondents

Symbols and Abbreviations Include:

† **Federal Government**
★ **Project of $500,000 or over**
ENR **Engineering News-Record**
CD **Engineering News-Record Construction Daily**
A-E-M **Architect—Engineer-Management type of contract.**

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork. Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR):

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comp'y with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

★**Conn., Stratford**—Wm. H. Shea, town mgr., Town Hall, incinerator plant exten. $800,000. M. J. Jankowsky, town engr.

†**Ga., Fort Benning**—Federal Works Agency, 20 Fifth St. N.W., Atlanta, bids soon lateral sewer line. $95,000.

★**Ill., Granite City, Madison and Venice**—Tri-City Chamber of Commerce, c/o Horner & Shifrin, engrs., Shell Bldg., 1221 Locust St., St. Louis 3, Mo., drainage sys. providing storm water and sanitary sewers for 10 mi. industrial and residential district from Nemeoki, to Venice, incl. Granite and Madison. $4,000,000.

†**Ill., Monsanto (br. East St. Louis)**—Village, c/o L. Sauget, R.R. 1, mayor, Monsanto, and B. H. McCurdy, Belleville, completing sewerage sys. About $287,800. **FWA.**

Ind., Indianapolis—Bd. P. Wks., H. A. Campbell, chn., City Hall, sewage treatment plant (32 new digesters). $100,000.

Neb., Beatrice—V. J. Morris, mayor, sewage plant. $30,000.

★**B. C., New Westminster**—Sewers, watermains, pavements, sidewalk in North East section of city. $500,000.

BIDS ASKED

Bids Asked August 3

†**Ia., Ankeny**—H. M. Fredericks, town clk., sewer and water sys., Ia. 13-128, $22,600. **FWA.** Plans deposit $15. Nemmers & Clark, 205 Hubbell Bldg., Des Moines, engrs. CD 6/17—ENR 6/24.

†**La., New Orleans**—City, R. O. Maestri, mayor, Room 502, 526 Carondelet St., sewer facilities, La. 16-243. $131,000. **FWA.** Plans deposit $50. A. B. Wood, 526 Carondelet St., engr. CD 7/8—ENR 7/15.

La., New Orleans—Purchasing Agent, Room 502, 526 Carondelet St., approx. 6,300 lin. ft. 24- to 30-in. sewers, etc., in Franklin Ave., Odin, Spain, Mendez, Painters and Frankfort Sts., Contr. 137-S, for Sewerage & Water Bd., 526 Carondelet St. $133,000.

LOW BIDDERS

Calif., Los Angeles—City, City Hall, July 14, sanitary sewers, Lansdowne Ave., Barnett Rd. to Eastern Ave., etc., and vitr. clay sanitary sewers, Monticello Dr. from Montecito Circle to Pagoda Road, etc., from Burch & Bebek, 8003 S. Bway, $32,836 and $76,539 respectively. L. Aldrich, City Hall, engr.

†**Conn., Bridgeport**—City Hy Com., City Hall, July 21, Contr. 6, 4,600 ft. 8- to 48-in. sanitary trunk sewer, Seaview and Connecticut Aves., Conn. 6-107, from Cecio Bros., 31 Griggs Ave., Greenwich, $67,653. CD 7/9—ENR 7/15.

Wis., Sturgeon Bay—City, E. S. Ackerman, clk., July 12, storm sewers and watermains, from John Schlisle, Sturgeon Bay **$34,120.** CD 2/2—ENR 2/4.

CONTRACTS AWARDED

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, incinerator, Contr. 868-Eng-5490, Marin Co., to W. C. Akard, Alameda and Potrero Aves., San Francisco, under **$50,000.**

†**Georgia**—U. S. Eng., 512 Spring St. N.W., Atlanta, incinerator, Contr. 2034-Eng-11047, Cobb Co., to MacDougald Constr. Co., Northside Dr. N.W., Atlanta, under **$50,000.**

†**Ill., Glenview**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., storm drainage facilities, Naval Air Station, NOY 6369, to John C. Tully & Co., 33 N. La Salle St., Chicago, **$150,566.**

Tex., Dallas—Dallas Co., storm sewers Clarendon St., to Wallace & Bowden, 5513 E. Grand St., **$29,000.**

Man., Portage La Prairie—Secy. Dpt. Munitions & Supply, Ottawa, Ont., sewage disposal plant at No. 7 A. O. S., to H. D. Spratting, 1217 13 St., Brandon, Ont., **$36,000.** CD 6/23—ENR 7/1.

BRIDGES

PROPOSED WORK

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, timber foot bridges, Job 1039, San Francisco Co.

Louisiana—State Dpt. Hys., Baton Rouge, 201 ft. bridge with removable 50 ft. I-beam span to replace existing bridge across Bayou Grosse Tete, Iberville Co.

Mass., Waltham—City, Purchasing Agent, P. Wks. Dpt., City Hall, rejected bids 7/16, stone-faced bridge over Charles River, Moody St., J. R. Worcester & Co., 79 Milk St., Boston, engrs. CD 7/20—ENR 7/22, under LB.

Tex., Corsicana — Chicago, Burlington & Quincy R.R. Co., H. R. Clarke, ch. engr., Kirby Bldg., Dallas, and The Chicago, Rock Island & Pacific Ry Co., F. W. Thompson, ch. engr., 118 S. Field St., Dallas, bridge reconstruction. Over $25,000

Que., St. Maurice—Bridge. $30,000.

BIDS ASKED

Bids Asked August 4

Mass., Waltham—Purchasing Agent, P. Wks. Dpt., stone faced bridge over Charles River, at Moody St. $130,000. Plans deposit $5. J. R. Worcester & Co., 79 Milk St., Boston, engrs. CD 7/22—ENR 7/29.

Bids Asked August 11

California—State Div. Hys., Sacramento, repairing 4 bridges across Burney Creek at Burney, Shasta Co. G. T. McCoy, state hy. engr.

Bids Asked

Quebec—Province of Quebec, Quebec City, reconstructing 2 bridges over Salmon River, Ascot, $40,000; Lepage Bridge over Salmon River, Compton, $35,000; Moe's River Village Bridge, Moe's River, $70,000, O. Desjardins Dpt. P. Wks., Quebec City, engr.

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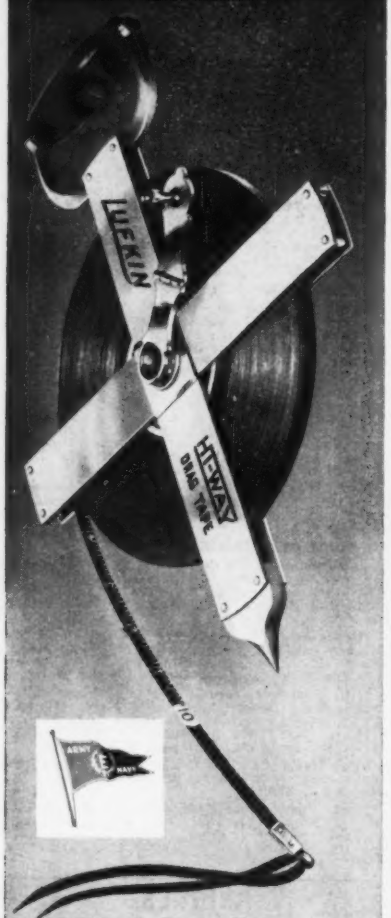

"Hi-Way" Drag Tapes are made from a special, extra-tough steel with black lines and figures deeply cut into bright portions of the line. That's why Engineers everywhere find the "Hi-Way" easy to read and use even after an unbelievable amount of wear from dragging around. See them at your dealers. Write for Catalog.

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TAPES · RULES · PRECISION TOOLS

BRIDGES, etc. (Continued)

LOW BIDDERS

Louisiana—State Dpt. Hys., Baton Rouge, July 21, Bayou Kelso bridge relocation 0.582 mi. Cameron Parrish, from H. M. Young, Jr., 910 Louisiana National Bank Bldg., Baton Rouge, **$70,675.** CD 7/16 under Roads.

†**Virginia**—At Office H. J. Spellman, dist. engr. P. Roads Admin., 1440 Columbia Pike, Arlington, July 22, Project Va DAWR-21, Bridge 104, Henry G. Shirley Memorial Hy., from Troitino Constr. Co., Alexandria, **$74,206.** FWA. CD 7/9—ENR 7/15.

CONTRACTS AWARDED

Mo., St. Louis—C. H. Ellaby, pres. Bd. P. Serv., cleansing, painting steel of combined eastern railroad and hy. approaches and north approach to Douglas MacArthur Bridge across Mississippi River, to Stanley Hanks Painting Co., 6292 Stillwell Dr., **$37,418.** Est. $45,000. Bids 7/13. CD 6/29—ENR 7/2.

Tex., Pasadena—L. Atkinson, mayor, timber bridges, culverts for access roads, street imprvs., to Ole Peterson, 6612 Capitol Ave., Houston, **$29,445.** CD 6/1—ENR 7/8.

Washington—State Hy. Dpt., Olympia, reconstructing portions Sixth Ave. and Point Fosdick terminals, Tacoma Narrows Ferry, to Hart Constr. Co., E. 11 and Hylebos waterway, Tacoma, **$35,416.** Bids 7/20. B. Bantz, state hy. dir.

Que., Notre Dame de Lourdes de Lorrainville—Municipality, 100 ft. rein.-con. La Lourtre bridge, 20 ft. wide, on Hy. 58 between 6 and 7 Ranges, DuHamel Twp., to La Societe de' Enterprises Generales, Ltd., Amos, Que., about **$75,000.** V. Boutin, Lorrainville, secy

Que., St. Pacome—B. Dube, municpality clk., 3 span, 200 ft. rein.-con. bridge, to J. F. Normand, L'Islet. Est. **$25,000.** O. Desjardins, Dpt. P. Wks., Quebec City, engr.

STREETS AND ROADS

BIDS ASKED

Bids Asked August 2

Ont., Camp Borden—Secy. Dpt. Munitions & Supply, Ottawa, Ont., surfacing Borden, Alliston Rd., for Dpt. Natl Defense (Army), Ottawa, Ont. $75,000-$100,000.

Que., St. Jerome—Dpt. Munitions & Supply, Ottawa, Ont., roadways and parade grounds at Military Training Center, for Dpt. Natl. Defense, (Army), Ottawa, Ont. About $45,000.

Bids Asked August 3

West Virginia—State Road Comn., D. McClaugherty, secy., Charleston, grading, draining, asphaltic concrete on macadam surfacing 2.165 mi. Tyler Creek Culvert and Approaches, State Route 25 U. S. Route 35, Proj. DAWI 4-B-1, Kanawha Co.; 0.061 mi. Knobly-Pinto-Road, Secondary Route 9, Proj. DAWI 9-A-1, Mineral Co.

West Virginia—State Road Comn., D. McClaugherty, secy., Charleston, grading, draining, asphaltic concrete on macadam surfacing 2.165 mi. Tyler Creek Culvert and approaches, State Route 25 and U. S. Route 35, Kanawha Co.; 0.061 mi. Knobly-Pinto Rd., Secondary Route 9, Mineral Co.

Que., Sherbrooke—Secy. Dpt. Munitions & Supply, Ottawa, Ont., roads parade grounds and drainage sys. at C. A. (8.) Training Center, for Dpt. Natl. Defense (Army), Ottawa, Ont. About $55,000.

Bids Asked August 5

Md., Baltimore—City, Bd. Awards, City Hall, concrete paving alleys, Contr. WCC 161. Plans deposit, $5, not refunded.

Bids Asked August 6

Kansas—State Hy. Dpt., Wichita, resurfacing material 8.559 mi. Proj. 5615, Cowley Co.; bituminous material surfacing 10.319 mi. K-5083, Sedgwick Co.; 14.058 mi. Proj. 5516, Rush Co. R. C. Keeling, Topeka, engr.

Bids Asked August 10

O., Cleveland—Bd. Comrs. Cuyahoga Co. G. H. Stahler, clk., asphaltic concrete resurfacing 1,800 cu. yd. Maslick Rd. $41,050. J. O. McWilliams, Standard Bldg., co. engr.

Bids Asked August 11

California—State Div. Hys., Sacramento grading shoulders and placing untreated rock base and road mix surfacing 6.1 mi. Merced Co.; plant mix material on crusher run surfacing and applying seal coat for repairing 2.9 mi. road near Pittsburg and Brentwood, Contra Costa Co.; 2.7 mi. road in Paso Robes, San Luis Obispo Co. G. T. McCoy, state hy. engr.

Bids Asked August 12

California—State Div. Hys., State Bldg., Los Angeles, repairing with plant mix material 4.4. mi. Ventura Blvd. between Calabasas and Newburg Park, Los Angeles and Ventura Counties. G. T. McCoy, Pub. Wks. Bldg., Sacramento, state hy. engr.

Minnesota—State Hy. Dpt., St. Paul, crushed rock surfacing 28,630 cu. yd., for Maintenance Dist. 12. $25,000 (unofficial).

Bids Asked August 13

Kentucky—Dpt. Hys., Frankfort, bituminous surfacing 3.4 mi. Catlettsburg-Louisa Rd., SP 10-85 (1), Boyd Co., bituminous resurfacing 3.139 mi. Eminence-Ballardsville Rd., SP 52-207, Henry Co.; medium type surfacing 2.67 mi. Catlettsburg-Louisa Rd., SP 10-85 (2), Boyd Co.; grading, draining, low type surfacing 5.4 mi. Soldier-Oliver Hill Rd., SP 22-128, Carter Co.; bituminous concrete resurfacing 1.265 mi. Lexington and Main Sts. in Winchester, SN-SP 25-22, SN 25-152, SP 25-42, Clark Co.; grading, draining, medium type surfacing 0.16 mi. Owensboro-Beach Grove Rd., SP 30-177, Daviess Co.; concrete and traffic bound widening 1.032 mi. Phillips Lane RD 2, Jefferson Co.; grading, draining, traffic bound surfacing 1.638 mi. Farnsley Rd., RH 34, Jefferson Co.; grading, draining high type surfacing 0.728 mi. Ky. 55 in Providence, SP 117-349, Webster Co.

Minnesota—State Hy. Dpt., St. Paul, crushed rock base and bituminous surface treatment 8.1 mi. road between Wykoff and Fountain. Plans deposit 70c. O. L. Kipp, ch. engr.

LOW BIDDERS

California—State Div. Hys., 808 State Bldg., Los Angeles, July 15, imprv. 7.5 mi. Ventura Co., from G. W. Ellis, 8240 Lankersheim Blvd., North Hollywood, **$60,315**; 4.4 mi. Los Angeles Co., from Schroeder & Co., 8140 Tujunga Blvd., Rosco (Los Angeles), **$34,783.** CD 6/28, 7/2—ENR 7/1.

California—State Div. Hys., Sacramento, July 21, imprv. 10.8 mi. Solano Co., from McGillivray Constr. Co., Box 873 Sacramento, **$86,878**; 2 mi. Mendocino Co., from Close Building Supply, 721 C St., Hayward, **$34,373.** CD 7/2—ENR 7/8.

Indiana—State Hy. Comn., Indianapolis, concrete paving 2.601 mi. Marion Co., from Union Asphalt Constr. Co., 327 Lemcke Bldg., Indianapolis, **$165,777,** Est. $201,814. CD 5/18—ENR 5/20.

Louisiana—State Dpt. Hys., State Hy. Office Bldg., Baton Rouge, July 21, imprv. 4.454 mi. Vernon Parish, from T. W. Kleinpeter, 4047 Hatcher Dr., Baton Rouge, **$77,163.** CD 7/16

Michigan—State Hy. Comn., Lansing, July 21, imprv. 0.679 mi. Saginaw Co., from Comstock & Terry, P. O. Box 215, Bay City, **$29,385*****1.373 mi. Washtenaw Co., from Detroit Asphalt Paving Co., 702 Transportation Bldg., Detroit, **$39,334*****1.164 mi. Muskegon Co., from Vinton Constr. Co., Coldwater, **$25,838.** CD 7/15.

Mich., Riverview (mail Wyandotte)—Rd Comrs., Wayne Co., Barlum Tower, Detroit, paving, grading River Rd., Penningham to Payne, from Oxford Asphalt Co., Oxford, **$51,705.**

North Carolina—State Hy. & P. Wks Comn., Raleigh, July 22, imprv. 1.28 mi. Guilford Co., from F. D. Cline, Fairview Rd., Raleigh, **$46,255.** Est. $25,000-$50,000. CD 7/13—ENR 7/15.

Nebraska—State Dpt., Road & Irrigation, Lincoln, July 23, grading, sand gravel surfacing, culverts 3.1 mi. access road, DA-WR-10, from Roberts Constr. Co., 1018 Terminal Bldg., Lincoln, **$29,709.** CD 7/16.

★**Ohio**—State Hy. Dpt., Columbus, July 20, imprv. 6.007 mi. Lucas and Ottawa Counties, from Arthur S. Langenderfer & Co., 4690 W. Bancroft St., Toledo, **$121,580,** est. $129,130***1.758 mi. Trumbull Co., from Ohio Road Improvement Co., 341 Chamber of Commerce Bldg., Columbus, **$40,385,** est. $40,940 ***24.23 mi. Cranford, Richland, Ashland and Huron Counties, from Bucyrus Materials Co., Tiffin Rd., Bucyrus, **$66,310,** etc. $66,288*** 18.91 mi. Huron, Medina and Wayne Counties also 30.21 mi. Medina and Wayne Counties, from Allied Corp., 714 Keith Bldg., Cleveland, **$68,698** and **$76,907** respectively, est. $68,739 and $76,931 respectively***56.55 mi. Jackson, Lawrence and Pike Counties, from Paul Varga & Sons, 1385 Norton Rd., Columbus, **$56,446,** est. $56,880***2.808 mi. Tuscarawas Co., from Edgar Spring, Inc., St. Dover, **$26,499** est. $26,500***25.59 mi. Monroe, Morgan and Noble Counties, from Harley E. Calvin, Marietta, **$41,549,** est. $41,550***16.82 mi. Sandusky and Seneca Counties, from The Modern Constr. Co. Elks Bldg., Fremont, **$34,915,** est. $35,114***10.29 mi. Williams Co., from Lester Baker, St. Joe, Ind., **$41,806,** est. $41,903. Received no bids July 20 imprv. 17.47 mi. Franklin, Madison and Fayette Counties, 0.487 mi. Van Wert Co., 0.968 mi. Auglaize Co., 2.32 mi. Cuyahoga Co. Cancelled bids to have been opened July 20, imprv. 0.933 mi. Cuyahoga Co. CD 7/15.

★**Texas**—State Hy. Comn., B. P. Gentry, chn., Austin, July 20, Imprvs. 27.241 mi. Wilson Co. and 44.72 mi. Bexar and Atascosa Counties, from J. D. Scarbrough, St. Anthony Hotel, San Antonio, **$36,521** and **$49,161** respectively, est. $40,000 and $45,000 respectively***2.942 mi. Bexar Co., from Briggs & Killian, P. O. Box 1981, San Antonio, **$57,621,** est. $60,000***7.414 mi. Jackson Co., from W. C. Evans, Castle Hill Lane, San Antonio, **$43,510,** est. $40,000***0.022 mi. Galveston Co., from Ole Peterson & Son, 6608 Capitol St., Houston, **$65,839,** est. $70,000***8.618 mi. Coryell Co., from H. L. Campbell, 2425 Winton Terrace, W., Fort Worth, **$119,031,** est. $120,000***9.333 mi. Hale Co., from Uvalde Constr. Co., 2400 Uvalde St., Dallas, **$94,615,** est. $80,000***11.431 mi. Midland Co., from Thomas & Ratcliff, Rogers, **$77,743,** est. $80,000. Received no bids July 20, soil cement base and seal coat 2.533 mi. U. S. Hy. 271, Control 221-3-13, Red River Co., $40,000. CD 7/13.

Virginia—Dpt. Hys., Richmond, July 20, furnishing, del., applying 6,697 tons bituminous plant-mix materials, Lynchburg Dist., from Cunningham & Short, Box 630, Roanoke, **$56,724.** CD 7/12—ENR 7/15.

STREET and ROADS (Continued)

CONTRACTS AWARDED

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, roads, northern California, Job 977, to Parish Bros., 619 H St., Sacramento. Awarded 7/19.

California—State Div. Hys., Sacramento, imprv. 21 mi. Nevada, Placer and Sierra Counties, day labor. Est. $25,000. Bids 7/7 rejected. CD 7/13—ENR 7/15 under LB.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, grading, paving, Contr. 868-Eng-5510, Alameda Co., to Whalin Bros., 2942 23 Ave., Oakland, under $50,000.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, road imprvs., Contr. 868-Eng-6502, Marin Co., to Frederickson & Watson Constr. Co., and Frederickson Bros., 873-81 Ave., Oakland, $100,000-$500,000.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, paving, Contr. 868-Eng-5486, San Luis Obispo Co., to Granite Constr. Co., Watsonville, under $50,000.

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, roads, walks, Neg-Jax-43-1037, Duval Co., to B. B. McCormick & Sons, Graham Bldg., Jacksonville, under $50,000. Awarded 6/15.

†**Ill., Great Lakes**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W. Wash., D. C., paving and parking areas, Naval Training Station, NOY 6359, to Suburban Oil Co., 1100 W. Garfield St., Oak Park, Chicago, $117,982; drainage for heating lines, NOY 6437, same project, to Arcole Midwest Corp., Chicago, $109,200.

La., Sterlington—Louisiana Power & Light Co., Sterlington, roads, sidewalks, sewers for housing, to McBride & Son, Bastrop, $115,328. H. H. Land, 1104 Ouchita Natl. Bank Bldg., Monroe, engr.

Minn., Duluth—St. Louis Co., bituminous surfacing roads, to Ashworth-Hawkinson Co., 2001 Alabama Ave., St. Louis Park, $31,770.

†**New Mexico**—U. S. Eng., Albuquerque, grading, paving, Lea Co., to J. E. Skousen, Hobbs, $100,000-$500,000.

Ohio—State Hy. Dpt., Columbus, bituminous treatment 32.93 mi. Geauga and Lake Counties to Northeastern Road Imprvt. Co., Pelton Rd., Willoughby, $71,198. Est. $71,463. Bids 7/6. CD 7/15—ENR 7/22.

Pa., Pittsburgh—Paving Preble Ave., to Ben Constr. Co., 101 Hargrove St., $58,722*** asphaltic resurfacing various streets and bridges, to Allegheny Asphalt & Paving Co., 411 Blvd. Allies, $79,079. CD 7/7.

†**Tennessee**—Tennessee Valley Auth., Knoxville, constructing roads, located west of Linden, along Tennessee River and Tennessee Hy. 70, Reg. 433371, to Hart & Hart, Camden, $193,781. Bids 7/8. CD 6/25—ENR 7/1.

†**Texas**—U. S. Eng., Fort Sam Houston, road relocation, Bell Co., to D. Word, 446 E. Rosewood St., San Antonio, under $50,000.

†**Texas**—U. S. Eng., 231 W. Main St., Denison, asphalt paving, Tarrant Co., to Texas Bitulithic Co., 111 Commerce St., Dallas, $100,000-$500,000.

Tex., Pasadena—L. Atkinson, mayor, dirt work for access roads, street imprvs., to O. W. Bruhn, 6412 Jefferson St., Houston, $36,500. Garrett Eng. Co., 1806 Milam St., Houston, engrs.

West Virginia—State Rd. Comn., Charleston, imprv. Yawkey Rd., Proj. 3453, etc., Ranger, Lincoln Co., to Abbot Constr. Co., Capitol and Piedmont Rd., Charleston, $32,209; Levivasy Rd., Proj. 217-A, etc., Nettie, Nichols Co., to A. A. Bostic & Son, Rupert, $30,694. Bids 7/20. Rejected bids July 20, imprv. roads, Barbour and Upshur also Berkeley and Jefferson Counties. CD 7/12—ENR 7/15.

Alta., Edmonton—A. Rusell, city clk., bituminous sidewalks on 87 and 90 Sts., concrete sidewalks on 84 St., plank sidewalk on 112 Ave., 101, 102 and 103 Sts., also grading on four sts., day labor, $35,000.

EARTHWORK, WATERWAYS

PROPOSED WORK

Kan., Topeka—Shawnee Co., C. E. Holman, clk., 12 mi. dike along Kaw River for flood control, $20,000.

Louisiana—The Texas Co., 919 St. Charles St., New Orleans, dredging channel to depth of 7 ft. below mean low water level over bottom widths of 60 to 135 ft., to connect with existing channel and to install a drilling and boiler barge, appurtenant structures therein for drilling exploratory oil well designated as State-East Cote Blanche Bay No. 5, in East Cote Blanche Bay, St. Mary Parish.

†**Nevada**—U. S. Indian Irregation Service, 647 Phelan Bldg., San Francisco, Calif., White Narrowa Dam 37 ft. high, compacted clay fill, in Muddy River, Moapa Valley, Clark Co. $300,000. E. C. Fortier, Phelan Bldg., San Francisco, Calif., dist. engr.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, concrete, steel seawall, Galveston Co.

★**Tex., Fort Worth**—Tarrant Co., c/o Clarence Kraft, judge, making plans flood control project, incl. sys. levees along Trinity River, combination road and levee, also several other smaller creeks. $1,500,000. R. W. Gibbons, Fort Worth, co. engr.

Alta., Red Deer—Municipality, diversion of Waskiesiu Stream to prevent flooding, $25,000. J. R. Jones, Town Hall, engr.

BIDS ASKED

Bids Asked August 4

†**Illinois**—U. S. Eng., 816 U. S. Courthouse & Customhouse, St. Louis, Mo., 105,000 cu. yd. levee repair work, Madison Co.

Bids Asked August 9

†**California**—Bureau of Reclamation, Dpt. Interior, Denver, Colo., 80 ton and 40 ton gantry cranes for Friant Dam, Friant Div., Central Valley Proj., Spec. 1055. Extended date. S. O. Harper, ch. engr. CD 6/29—ENR 7/1.

Bids Asked August 10

†**California**—Bureau of Reclamation, Dpt. Interior, Denver, Colo., furnishing, del. fixed-wheel gate for river and Friant-Kern Canal outlets at the Friant Dam, Friant Div., Central Valley Proj., Spec. 1698-D. S. O. Harper, ch. engr.

Bids Asked August 14

California—California Water & Telephone Co., 300 Montgomery St., San Francisco, at 19 W. 19 St., National City, concrete variable arch dam, about 198 ft. in height to center section of spillway and crest length approx. 614 ft., and dike across Sweetwater River, 20 mi. east of Chula Vista, San Diego Co. Plans deposit $5. (not returnable). Clayton B. Neill, Monterey, and Lovelenad Engrs., 300 Montgomery St., San Francisco, engrs.

Bids Asked early in September

Okla., Ponca City—L. A. Cann, city mgr., and C. E. Norton, city clk., raising, widening Lake Ponca dam approx. 4 ft., paving portion of spillway, drainage of water from base of dam, etc. $127,246. Burns & McDonnell, 107 W. Linwood Blvd., Kansas City, Mo., engrs.

LOW BIDDERS

★†**California**—Bureau of Reclamation, Old Post Office Bldg., Sacramento, earthwork, structures, Station 452 plus 00 to Station 1050 plus 75, Madera Canal, Friant Div., Central Valley Proj., Spec. 1054, from Larsen Bros. & Harms Bros., Rt. 4, Box 2220, Sacramento, $587,588. CD 6/22—ENR 6/24.

CONTRACTS AWARDED

†**Colorado**—U. S. Eng., 909 17 St., Denver, excavation, concrete pipe, concrete drop inlet, etc., Contr. 1728-eng-371, Pueblo Co., to Peter Kiewit Sons' Co., 4521 Dodge St., Omaha, Nebr., and Big Horn Constr. Co., Sheridan, Wyo., $100,000-$500,000.

†**Michigan**—U. S. Eng., P. O. Box 2859, 700 Union Guardian Bldg., Detroit, Zone 31, dredging canal entrance, Chippewa Co., to Great Lakes Dredge & Dock Co., 122 South Michigan Ave., Chicago, Ill. Est. under $1,000,000.

Tex., Laredo—H. B. Zachry Co., Laredo, and P. O. Box 596, San Antonio, irrigation sys. for 6,000 acre vegetable plantation, force-account, $70,000. CD 5/11—ENR 5/13.

UNCLASSIFIED

PROPOSED WORK

Louisiana—WHARF—W. Kerner, Barataria, 59 ft. covered timber wharf, 44 ft. wide, on timber pile fdn. in Bayou Barataria, etc., near Lafette, Jefferson Parish.

†**Louisiana**—PILE CLUSTERS, etc.—U. S. Eng., foot of Prytania St., New Orleans, withdrew bids to have been opened July 27, pile clusters, fenders, wharf and access roads, Spec. 16-047-44-1, near Calcasieu Parish.

La., Meraux—WHARF—Meraux Petroleum Storage Co., exten. wharf, 320 ft. long, 8 ft. wide on prolongation from the upstream end of existing structure, installing, maintaining 2 clusters of 14 piles each with brace clusters in Mississippi River, St. Barnard Parish.

La., Monroe—OIL WELL—Hope Producing Co., Monroe, drilling, casing, developing oil well test.

La., Monroe—OIL WELL—Union Producing Co., Monroe, drilling, developing deep test oil well.

Mass., Boston—WATCH TOWER—Suffolk Co., office of Sheriff, 215 Charles St., 3 story, 12x12 ft. brick, wall-watch tower, Charles St. jail. $25,000-$30,000.

Oklahoma—OIL WELL—Texas Co., Texas Bldg., Houston, Tex., drilling, casing, developing 9,000 ft. test oil well, Marshall Co., across Red River from Sherman, Tex.

S. D., Kimball—SWIMMING POOL—City, City Hall, swimming pool, $25,000.

Texas—OIL WELL—F. M. Boykin, Jr., Taft, drilling, casing, developing, 6,700 ft., test oil well, San Patricio Co.

Texas—OIL WELL—Gulf Oil Corp., Gulf Bldg., Houston, drilling, casing, developing new 12,000 ft. oil well, Brazoria Co.

Texas—OIL WELLS, etc.—General American Oil Co. of Texas, Republic Bank Bldg., Dallas, oil well drilling, pipeline connections for flowing oil wells, etc., Winkler Co. area. Over $25,000.

Tex., Andrews—OIL WELL—Consolidated Oil Corp., Wright Bldg., Tulsa, Okla., drilling, developing new 11,000 ft. oil well.

Tex., Beeville—OIL WELL—Atlantic Refining Co. & Southwood Petroleum Corp., drilling, developing, new deep test oil well.

Tex., Bowie—OIL WELL—Continental Oil Co., Eagle Ford Bldg., Dallas, drilling, casing, developing, 7,300 ft. oil well.

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UNCLASSIFIED (Proposed Work, Cont'd,)

Tex., Bowie—OIL WELL—Wilcox Oil & Gas Co., Bowie, drilling, developing 6,100 ft. oil well.

Tex., Bronte—OIL WELL—H. Sadler, Robert Lee, drilling, developing 2,000 ft. oil well test.

Tex., Grand Prairie—TRANSMISSION LINE—Texas Electric Service Co., outside 12,000 volt power transmission line from Handley to here. $40,000.

Tex., Katy—OIL WELL—Northern Ordnance, Inc., Esperson Bldg., Houston, and Katy, drilling, developing oil well test.

Tex., Malakoff—OIL WELL—Stanolind Oil & Gas Co., Fair Bldg., Fort Worth, drilling, casing, developing deep test oil well.

Tex., Nederland—IMPROVEMENTS—Jefferson Co., c/o Judge Beaumont, plans by Wignall & Noff, Port Arthur, and H. Woodside, Beaumont, imprvs., 2 story admin. bldg., mechanical repair shop, $175,000.

N. S., Causa—WHARF—Dpt. P. Wks., Ottawa, Ont., repairing wharf. $26,000.

Ont., Toronto—TRAINING CENTER—Navy League of Canada, 1118 Bay St., making plans naval training center. $150,000. K. S. Gillies, City Hall, Toronto, engr.

BIDS ASKED

Bids Asked August 2

N. Y., New York—PIER REMOVAL, etc.—Comr. Marine & Aviation, Pier A, foot of Battery Pl., North River, complete removal of Pier Old 25 and dredging, near foot of N. Moore St., North River, Manhattan Boro, Contr. 2368.

Bids Asked August 3

New York—CABLES, etc.—Dpt. Hospitals, 125 Worth St., New York, underground electric cables and distr. sys. at Sea View Hospital, Castleton Corners, Staten Island.

Man., Lenore — IMPROVEMENTS — Acting Secy. Dpt. Transport, Ottawa, Ont., imprvs., grading, smoothing, fencing. About $45,000. Plans deposit $10.

Saskatchewan — IMPROVEMENTS — Acting Secy. Dpt. Transport, Ottawa, Ont., imprvs., grading, smoothing, fencing, road imprvs., Davidson West. $55,000. Plans deposit $10.

Bids Asked August 4

Alberta—IMPROVEMENTS—Acting Secy. Dpt. Transport, Ottawa, Ont., developing imprvs., Frank Lake, High River and Gladys, incl. grading, smoothing, fencing, imprv. roads. About $100,000. Plans deposit $10.

Bids Asked August 10

†Md., Beltsville — IMPROVEMENTS — Civil Aeronautics Admin., Dpt. Commerce, 14 St. and Constitution Ave. N.W., Wash., D. C., imprvs., conditioning, fertilizing and seeding, liming, repairing sect. drainage sys., Proposal 2149.

†Tex., El Paso — IMPROVEMENTS — Civil Aeronautics Admin., Dpt. of Commerce, P. O. Box 1689, Fort Worth, imprvs. Extended tentative date. Plans deposit $20. CD 7/13 —ENR 7/15.

Bids Asked August 16

★**†California**—TRANSMISSION LINE—Bureau of Reclamation, Redding, 100 mi. 230,000 volt, single-circuit, 60 cycle, woodpole, H frame type transmission line, from Shasta power plant to Oroville substation, Kennett Div., Central Valley Proj., Spec. 1056. $1,900,000.

Bids Asked

†Oklahoma — CONTROL TOWER, etc. — U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, control tower, etc., Oklahoma Co. $25,000.

†Tex., Coleman — IMPROVEMENTS — Coleman Flying School, Ltd. (operators), imprvs., bldg., facilities Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., will finance. L. E. O'Banton, 2610 Fairmont St., Dallas, archt.

LOW BIDDERS

†California—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, imprvs., No. 113, San Bernardino Co., from O'Neal & Hedberg, 852 S. Robertson Blvd., Los Angeles, over $50,000.

Calif., San Francisco—PIER APRON—Bd. State Harbor Comrs. for San Francisco Harbor, Ferry Bldg., reconstructing apron, north side Pier 48, from Mars Metal Co., 23 and Minnesota Sts., $76,377. Frank G. White, Ferry Bldg., ch. engr.

CONTRACTS AWARDED

†Arizona — IMPROVEMENTS — U. S. Eng., 751 S. Figueroa St., Los Angeles, 14, Calif., imprvs., crash station, No. 229F, Cochise Co., to Gilbert E. Olson, Title & Trust Bldg., Phoenix, under $50,000. Awarded 7/15.

†Arizona — IMPROVEMENTS — U. S. Eng., 751 S. Figueroa St., Los Angeles, 14, Calif., imprvs., No. 107, Cochise Co., to Arizona United Constructors, P. O. Box 1, Sta. H., Los Angeles, Calif., over $100,000.

†California—GREASE and WASH RACKS, etc.—U. S. Eng., 74 New Montgomery St., San Francisco, grease, wash racks, etc., central California, to Peter Sorensen, 927 Arguello St., Redwood City. Awarded 7/19.

†California — HANGAR DOORS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., hangar doors, Nulls Field, NOY 6938, to Truscon Steel Co., 604 Mission St., San Francisco, $37,940.

†California—BALLOON TRACK, etc.—U. S. Eng., 74 New Montomery St., San Francisco, balloon track and loading spurs, Contr. 868-Eng.-5494, Monterey Co., to A. D. Schader, 144 Spear St., San Francisco, under $50,000.

†California—GASOLINE STORAGE FACILITIES, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, gasoline storage and dispensing facilities, No. 109, San Bernardino Co., to R. E. Ziebarth, 815 W. 17 St., Long Beach, under $50,000. Awarded 7/19.

†California—IMPROVEMENTS—U. S. Eng., 1209 8 St., Sacramento, Zone 8, imprvs., repairing facilities, Spec. 634, Shasta, Sacramento, Tulare, Kern, and Butte Counties, to Kruly & Van Valkenburgh, 8609 San Vicente St., South Gate. Est. under $100,000.

†California—NIGHT LIGHTING SYSTEM—U. S. Eng., 74 New Montgomery St., San Francisco, night lighting sys., Contr. 868-Eng.-5500, Del Norte Co., to A. Brizard, Inc., Arcata, under $50,000.

†California—NIGHT LIGHTING SYSTEM—U. S. Eng., 74 New Montgomery St., San Francisco, night lighting sys., Contr. 868-Eng.-5499, Montrey Co., to Collins Electrical Co., Stockton, under $50,000.

†California — TRANSITION TARGET POINTS—U. S. Eng., 74 New Montgomery St., San Francisco, transition target Points, Contr. 868-Eng.-5495, Monterey Co., to Howson Bros., Gilroy, under $50,000.

★**†Calif., Coronado**—FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., amphibious facilities, Amphibious Training Base, NOY 6756, to Zoss Constr. Co., 1037 N. Colorado Ave., Hollywood, $1,703,304.

†Calif., Moffett Field—RUNWAYS, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., exten. runways and taxiways, NOY 6163, to Stolte, Inc., 1405 San Antonio Ave., Alameda, Calif.

†Calif., San Francisco—FLOATING DRY DOCK BERTH—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., berth for floating dry dock, NOY 6361, to Clinton Constr. Co., 932 Folsom St., San Francisco, $151,000.

†Conn., Hartford—IMPROVEMENTS—Civil Aeronautics Admin., P. O. Box 636, La Guardia Field, Jackson Heights, New York, N. Y., imprvs., grading, paving, drainage, Proj. 13-545, to E. B. McGurk, Inc., 355 Barbour St. Est. $42,567. Bids 7/8. CD 7/1.

†D. C., Wash.—FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., expansion facilities, Navy Yard and Navy Yard annex, NOY 6295, to Skiner & Garrett, 1728 Eye St. N.W., $316,750.

†Florida—AVIATION FACILITIES—Yards & Docks, Navy Dpt., 18 St., and Constitution Ave. N.W., Wash., D. C., Auxiliary Aviation facilities, boat facilities, machine shops, Mayport Field, NOY 6511, to Hillyer & Lovan, 111 W. Ashley St., Jacksonville, $59,161.

†Florida—IMPROVEMENTS—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, imprvs., Neg-Jax-43-18, Marion Co., to Sullivan Constr. Co., Sarasota, under $50,000. Awarded 7/16.

†Florida—TENT FRAMES—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, tent frames, Neg-P.Y.-43-6, Marion Co., to Paul A. Smith Constr. Co., 320 Rome Ave., Tampa, under $50,000. Awarded 7/17.

†Florida—TENT FRAMES—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, tent frames, Neg-O.R.-44-1, Osceola Co., to Steinert Constr. Co., 5027—14th Ave. N., St. Petersburg, under $50,000. Awarded 7/17.

†Florida—VAULT—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, vault, Neg-Jax-43-1083, Pinellas Co., to Fred Howland, Inc., 1114 Postal Bldg., Miami, under $50,000. Awarded 6/18.

★**†Fla., Fernandina** — IMPROVEMENTS — Civil Aeronautics Admin., Municipal Airport, Atlanta, Ga., imprvs., to C. G. Coffee Constr. Co., Eastman, Ga., $1,005,000. Bids 6/29. CD 6/23.

†Fla., Miami — SPRINKLER SYSTEM — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., sprinkler sys., NOY 6332, to Crawford & Slaten Co., 820 Woodrow St., Atlanta, Ga., $140,387.

†Fla., Pensacola—TAXIWAYS, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., taxiways warming-up platform, etc., NOY 6545, Ellyson Field, and taxiways, warming-up platforms, gasoline distr. addn., NOY 6433, Barin Field, N.A.T.S., to Noonan Constr. Co., Pensacola, $94,977 and $84,968 respectively.

†Fla., Lake City—NAVAL AIR STATION BLDGS.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., navigation trainer bldgs., Naval Air Station NOY 6248, to Watt & Sinclair, 207 Royal Palm Way, Palm Beach, $34,255.

†Georgia—RAILROAD SPUR—U. S. Eng., Post Office Bldg., Savannah, railroad spur, Cont 819-Eng-1616, Chatham Co., to Savannah & Atlanta Railway Co., Louisville Rd., Savannah, under $50,000.

†Illinois—IMPROVEMENTS—U. S. Eng., 520 Merchandise Mart, Chicago, Ill., imprvs., Lawrence Co., to Swords-McDougal Co., 217 N. Adams St., Peoria, under $500,000.

†Ill., Glenview—AIR STATION PAVING, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., emer-

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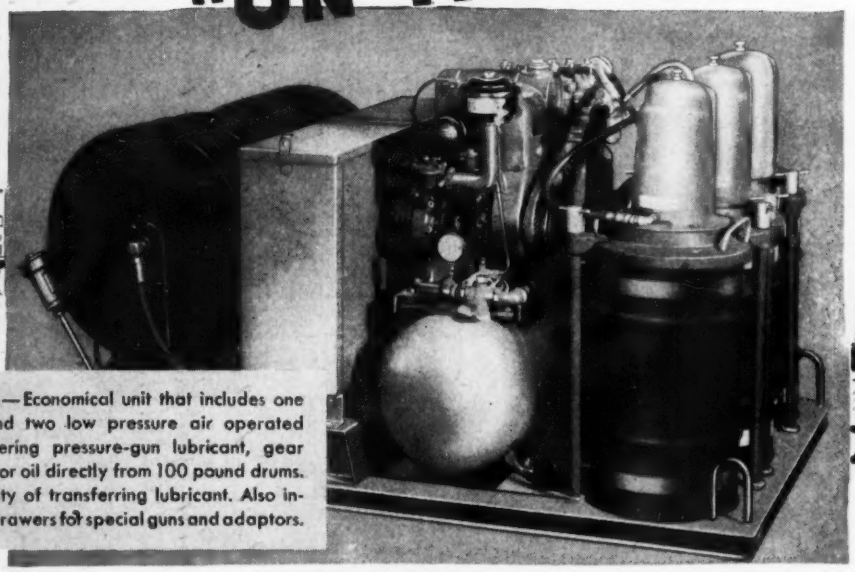

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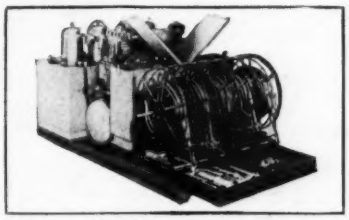

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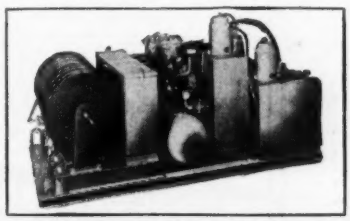

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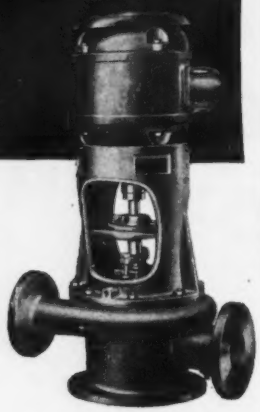

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UNCLASSIFIED (Contracts Awarded, Contd.)

gency repairs to concrete pavement at Naval Air Station, NOY 6424, to Standard Paving Co., 30 N. La Salle St., Chicago. $25,000.

★†**Ind., Bunker Hill**—FIELD SURFACING, etc.—Yards & Docks, Navy Dept., 18 St. and Constitution Ave. N.W., Wash., D. C., surfacing outlying field, NOY 6641, to S. G. Hayes Co., 600 S. Michigan Ave., Chicago, Ill., **$147,641**; surfacing outlying field, NOY 6368, to Gast Constr. Co., Wash., $183,561.

†**Kan., Olathe**—STORAGE FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., storage facilities at Naval Air Station, Spec. 11403, NOY 6456, to Swenson Constr. Co., 409 Victor Bldg., Kansas City, Mo., $63,102.

†**Louisiana**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, Tex., imprvs., excav., fencing, etc., Sol. 359-43-C172, Calcasieu Parish, to W. R. Aldrich & Co., Kalwrah University Gardens, Baton Rouge, under **$50,000.** Bids 7/12.

†**Louisiana**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, Tex., addnl. imprvs., Sol. 359-43-C172, Calcasieu Parish, to W. R. Aldrich & Co., Kalwrah University Gardens, Baton Rouge, **$50,000-$100,000.**

†**Maryland** — DRYDOCK — Maryland Drydock Co., Fairfield, Baltimore, installing Drydock 4, to Empire Constr. Co., 31 S. Calvert St., Baltimore, **$178,000.** Federally financed. CD 7/20—ENR 7/22 under LB.

†**Massachusetts**—FIRE ALARM SYSTEM—U. S. Eng., 31 St. James Ave., Boston, Mass., fire alarm sys., No. 175-43-Neg-400, Middlesex Co., to Gamewell Co., 1238 Chestnut St., Newton Upper Falls, under **$50,000.** Bids 7/9.

†**Mich., Grosse Ile**—SWIMMING POOL—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., swimming pool, Naval Air Sta., NOY 6689, to Gilbert Douglas Co., 439 Penobscot Bldg., Detroit. Total est. cost **$303,000.**

†**Missouri**—RAILROAD YARD, etc.—U. S. Eng., 816 U. S. Courthouse & Customhouse, St. Louis, railroad yard, 2,600 lin. ft. track with 4 turn-outs, 1,150 lin. ft. concrete driveway, grading, altering existing drainage sys., St. Louis Co., to Longwill-Scott Inc., 4030 Chouteau Ave., St. Louis, under **$50,000.**

†**Mo., St. Louis**—HANGAR, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., hangar, fire protection and imprv. landing field, Naval Air Station, NOY 6553, to Dickie Constr. Co., Louderman Bldg., St. Louis, **$220,373.**

†**Nebraska**—IMPROVEMENTS—U. S. Eng., 1709 Jackson St. Omaha, imprvs., addnl. bldgs., Sarpy Co., to Rorick Constr. Co., 3504 Harney St., Omaha, est. under **$50,000.**

†**Nebraska**—RIFLE RANGE—U. S. Eng., 1709 Jackson St., Omaha, rifle range, Contr. 643-Eng-4308, Scottsbluff Co., to Inland Constr. Co., 3867 Leavenworth St., Omaha, under **$50,000.**

†**New Jersey**—FENCING—U. S. Eng., 120 Wall St., New York, 5. N. Y., fencing, Contr. 1097-Eng-4164, Somerset Co., to Henkels & McCoy, Rittenhouse and Greene Sts., Phila., Pa., under **$50,000.**

†**New Jersey**—IMPROVEMENTS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., imprvs., addnl. paving, Contr. NOY 6790, Spec. 11691, to Union Paving Co., Broad and Stiles Sts., Phila., Pa. Total est. cost **$34,500.**

N. J., Lodi—TRANSMITTER STATION—National Broadcasting Co., Station WJZ, 30 Rockefeller Plaza New York, N. Y., radio transmitter station, to Skinner, Cook & Babcock, 60 E. 42 St., New York, N. Y. Alex D. Crosett Co., 512 5 Ave., New York, N. Y., engr.

★†**New Mexico** — IMPROVEMENTS — U. S. Eng., Albuquerque, imprvs., paving, drainage structures, etc., Chaves Co., to Allison-Armstrong & Thygesen, Roswell, **$500,000-$1,000,000.** Bids about 6/26.

†**N. Y., Brooklyn**—COFFERDAM—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., cofferdam for Dry Dock 2, Navy Yard, to J. Rich Steers, Inc., 17 Battery Pl., New York, **$94,000.**

★†**North Carolina**—AVIATION FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., completion aviation facilities, Marine Corps Air Station, NOY 6867, at Cherry Point, to T. A. Loving Co., Goldsboro (letter of intent). CD 7/14.

†**North Carolina**—IMPROVEMENTS—U. S. Eng., 33 Customhouse, Charleston, S. C., imprvs., bldgs., Robeson Co., to Boyle Constr. Co., Sumter, S. C., under **$50,000.** Bids 7/15.

†**Oklahoma**—FACILITIES—U. S. Eng., 416 Wright Bldg., Tulsa, addnl. facilities, Contr. 957-Eng-2014, Oklahoma Co., to Western Contracting Corp., 2100 E. 4 St., Sioux City, Ia., **$100,000-$500,000.**

†**Oklahoma**—FOUNDATIONS—U. S. Eng., 416 Wright Bldg., Tulsa, foundations, Contr. 957-Eng-2019, Tulsa Co., to Manhattan Constr. Co. of Okla., Muskogee, **$50,000-$100,000.**

†**Oklahoma**—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, imprvs., grading, drainage, Sol. 957-Neg-43-337 part, Payne Co., to Western Contracting Corp., 2100 E. 4 St., Sioux City, Ia., **$50,000-$100,000.**

†**Oklahoma**—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, imprvs., Sol. 957-Neg-44-5, Woodward Co., to Ottinger

UNCLASSIFIED (Contracts Awarded, Cont'd.)

Bros. Petroleum Bldg., Oklahoma City, $50,000-$100,000. CD 7/20—ENR 7/22.

†Okla., Norman—NAVAL AIR STATION—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., paving drill and exercise Area, Naval Air Sta., NOY 6666, to McMichael Concrete Co., P. O. Box 588, West Tulsa Sta., Tulsa, $42,054.

†Rhode Island—CLEARING—U. S. Eng., 819 Industrial Trust Bldg., Providence, clearing approach zone, No. 43-277, Kent Co., to Coleman & Collins, 318 Turks Head Bldg., Providence, $50,000-$100,000. CD 7/1—ENR 7/8.

†South Carolina—TRAINING AIDS—U. S. Eng., 33 Customhouse, Charleston, training aids, Charleston Co., to V. P. Loftis, Builders Bldg., Charlotte, N. C., under $50,000. Bids 7/19.

†South Dakota—RIFLE RANGE—U. S. Eng., 1709 Jackson St., Omaha, Neb., rifle range, Contr. 643-Eng-4280, Dawson Co., to Ohmans-Shiflet Corp., Lemmon, under $50,000.

†Texas—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, addnl. imprvs., Bastrop Co., to H. Page, Norwood Bldg., or Georgetown Rd., Austin, under $50,000.

†Texas—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs. in fueling and mechanical upkeep area, Bell Co., to L. F. Crockett, 112 Academy Dr., Austin, under $50,000.

★†Texas—IMPROVEMENTS—U. S. Eng., Albuquerque, N. M., imprvs., addnl. asphalt and concrete paving, Presidio Co., to Ernest Loyd, 3101 Stadium St., Fort Worth, $1,000,000-$5,000,000.

†Texas — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., addnl. facilities, Bell Co., to L. A. Christy, 503 Builders Exchange Bldg., San Antonio, under $50,000.

†Texas — UNDERGROUND UTILITIES — U. S. Eng., Fort Sam Houston, underground utilities, gas, water, sewer, Bexar Co., to Thrailkill & Jackson, 609 Builders Exchange Bldg., San Antonio, under $50,000.

Tex., Beaumont—IMPROVEMENTS—Jefferson (Mid-County) County, c/o Judge, imprvs., asphalt paving 25,000 sq. yd., to L. C. Russell Constr. Co., Beaumont, approx. $80,500.

Tex., Palestine — GAS DEVELOPMENT — Lone Star Gas Co., 1915 Wood St., Dallas, facilities (pipelines) for gathering low-pressure gases from field, force-account, $76,000. CD 7/7—ENR 7/15.

†Virginia—DRY DOCK—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave., N.W., Wash., D. C., 1,800 ton timber floating drydock, NOY 6737, to Tidewater Constr. Corp., 547 Front St., Norfolk, $415,000.

†Washington—FIRE PROTECTION FACILITIES—U. S. Eng., 800 3 Ave., Seattle, Zone 4, addnl. fire protection facilities, King Co., to Bay Constr. Co., 309 Pontius Ave., Seattle, Zone 4, under $50,000.

†Washington — TRACKAGE — U. S. Eng. 800 3 Ave., Seattle, Zone 4, temporary trackage, King Co., to West Coast Construction Co., Textile Tower, Seattle, Zone 1, under $50,000.

Wash., Tacoma — RELOCATING RAILROAD—City, City Hall, relocating 13 mi. Milwaukee Railroad through Nisqually canyon, to Strong & Mac Donald, 4045 Ruston Way. Est. $132,000.

N. B., Sackville—TRANSMITTER BUILDING—Canadian Broadcasting Corp., 1231 St. Catherine St. W., Montreal, Que., 2 story, 50x130 ft., rein.-con. international short wave transmitter bldg., concrete fdn., to Cook & Leitch, 1440 St. Catherine St. W., Montreal, Que., approx. $250,000.

LATIN AMERICA

Mexico, Chihuahua—Dpt. Public Works & Communications, Mexico City, plans vehicle road between Mexico City and Ciudad Juarez, Mexico, opposite El Paso, Tex. $1,000,000.

PUBLIC BUILDINGS

PROPOSED WORK

†Alabama—Pub. Housing Auth., NHA., Georgia Savings Bank Bldg., Peachtree and Broad St., Atlanta, Ga., plans by H. J. Frahn, Sheffield, family dwelling units, community and commercial bldgs.

†Ariz., Douglas—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., 60 family dwelling units, Ariz. 2328; 20 family dwelling units, Ariz. 2329.

†Ariz., Flagstaff—Pub. Housing Auth. NHA, 785 Market St., San Francisco, Calif., 90 family dwelling units, Ariz. 2330.

†California—Pub. Housing Auth., NHA, 785 Market St., San Francisco, plans by Russell Guerne De Lappe, 564 Market St., San Francisco, family dwelling units, Calif. 4727 and dormitory accommodations, Calif. 4728. CD 6/23—ENR 7/8.

†California — Pub. Housing Auth., NHA, 785 Market St., San Francisco, plans by Theo. J. Bernardi & Jas. Wickenden, 402 Jackson St., San Francisco, dormitory accommodations, Calif., 4733, and family dwelling units, Calif. 4724. CD 7/1—ENR 7/8.

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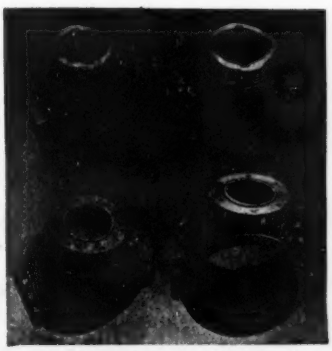

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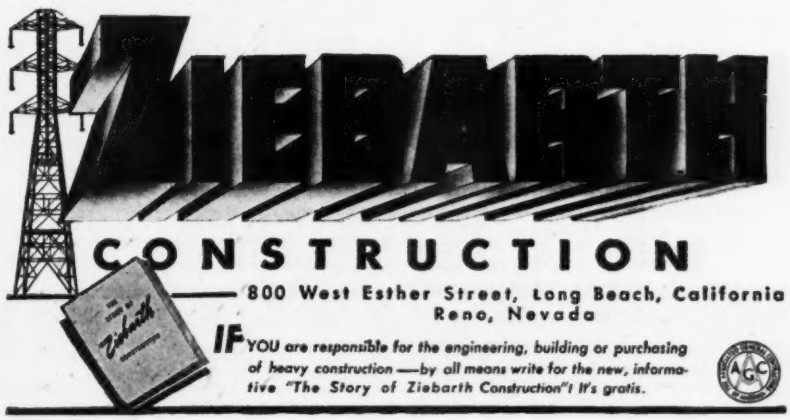
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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, housing, Spec. 916, San Francisco Co.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., Spec. 915, San Francisco Co.

★†**California**—Pub. Housing Auth., NHA, 185 Market St., San Francisco, Plans by Geo. Adams, 2430 Cascadia St., Glendale, Wm. T. Johnson, 1400 San Diego Trust & Savings Bldg., San Diego, Criley & Latta, 615 W. 5 St., Los Angeles, and Wm. P. Lodge, 521 B St., San Diego, family dwelling units, Calif. 4735, and dormitory units, Calif. 4736. Over $500,000.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., grease and wash rack, Job No. 1021, San Francisco Co.

†**Calif., Alameda**—Home Owners' Loan Corp., 821 Market St., San Francisco, Plans by M. J. Marquis, 675 37 St., Oakland, conversion of store bldg. at 900 Lincoln Ave., to provide 2 living units, Job No. D-20, $5,000.

†**Calif., Berkeley**—Home Owners' Loan Corp., 821 Market St., San Francisco, Plans by P. H. Hammarberg, 2 Norwood Ave., conversion residence at 2710 Haste St., to provide 7 living units, Job No. 74. $12,000.

†**Calif., Berkeley**—Home Owners' Loan Corp., 821 Market St., San Francisco, Plans by Frederick L. Langhorst, 402 Jackson St., San Francisco, conversion of residence at 2836 Derby St., to provide 3 living units, Job No. W-4B427. $5,000.

†**Calif., Berkeley**—Home Owners' Loan Corp., 821 Market St., San Francisco, Plans by P. H. Hammarberg, 2 Norwood Ave., conversion of residence at 3014 College Ave., to provide 4 living units, Job No. 943. $6,000.

†**Calif., Berkeley**—Home Owners' Loan Corp., Pacific Bldg., San Francisco, Plans by L. S. Mosias, 2957 Jackson St., San Francisco, converting fraternity house at 2498 Piedmont Ave., into living units, $18,000.

†**Calif., El Centro**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 40 family units, Calif. 4739.

†**Calif., El Centro**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Plans by Stanley Gould, 2030 El Abbolita Dr., Glendale, family dwelling units, Calif. 4739. CD 7/22—ENR 7/29.

†**Calif., Indio**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Plans by G. Stanley Wilson, 3681 6 St., Riverside, family dwelling units, Calif. 4740. CD 7/22—ENR 7/29.

†**Calif., Indio**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 20 family dwelling units, Calif. 4740.

†**Calif., Oakland**—Home Owners' Loan Corp., 821 Market St., San Francisco, Plans by F. L. Langhorst, 402 Jackson St., San Francisco, conversion of residence at 699 MacArthur Blvd., to provide addnl. living units, Job No. W-4B861. Over $5,000.

†**Calif., Oakland**—Home Owners Loan Corp., 821 Market St., San Francisco, Plans by M. J. Marquis, 675 37 St., conversion of hotel and restaurant at 3208 San Leandro Blvd., to provide 8 living units, Job No. B724, $10,000.

†**Calif., Oakland**—Home Owners Loan Corp., 821 Market St., San Francisco, Plans by Otto A. Deichmann, 1026 Market St., San Francisco, conversion of theatre bldg. at 38 and Reese Sts. to provide 44 livings units, Job No. W-4B685, $75,000.

†**Calif., Richmond**—Home Owners Loan Corp., 821 Market St., San Francisco, Plans by Otto A. Deichmann, 1026 Market St., San Francisco, conversion of night club at 5600 Panama Ave. to provide 16 livings units, Job No. W-4B621, $25,000.

★†**Calif., Richmond**—Defense Plant Corp., 811 Vermont Ave., N.W., Wash., 25, D. C., oil refinery plant, $13,500,000. Standard Oil Co., 225 Bush St., San Francisco, will operate.

†**Calif., Stockton**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 380 family dwelling units, Calif. 4741; 40 family dwelling units, Calif. 4742; 150 trailers, Calif. 4743, 72 dormitory units, Calif. 4744.

†**Colorado**—Pub. Housing Auth., Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., family dwelling units.

†**Colorado**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., plans by T. H. Buell & Co., engrs.-archts., 730 14 St., Denver, family dwelling units, Colo. 5102, 6 dormitory units, Colo. 5103. CD 7/9—ENR 7/15.

†**Conn., Bristol**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., 120 family dwelling units, Conn. 6205.

†**Idaho, Mountain Home**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Wash., 80 unit family housing, Ida. 10108.

†**Ind., Kingsbury-La Porte**—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., 174 unit family housing, Ind. 12114.

†**La., Baton Rouge**—Home Owners' Loan Corp., Sterick Bldg., Memphis, Tenn., 25 family unit conversion, program.

†**Me., Bath**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., 60 unit family housing, Me. 17081.

†**Me., Portland**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., 40 unit family housing, Me. 17080.

†**Massachusetts**—U. S. Eng., [illegible] Industrial Trust Bldg., sketches by J. R. [illegible]ester Co., 79 Milk St., Boston, bldg. exp[illegible], Bristol Co.

†**Massachusetts**—U. S. Eng., [illegible] St. James Ave., Boston (selected list bi[illegible]rary bldgs., No. 19-023-44-NE[illegible] tempo-Co. Barnstable

†**Mass., Falmouth**—Pub. Housing Auth., NHA, 270 Bway., New York [illegible] N. Y., 100 unit dormitory conversion, Mass. 13084.

†**Michigan**—Pub. Housing Auth., NHA, 2072 E. 9 St., Cleveland, O., plans by Britsch & Munger, 1025 Nicholas Bldg., Toledo, O., trailer unit housing, MI. 20206.

†**Michigan**—Pub. Housing Auth., NHA, 2072 E. 9 St., Cleveland, O., trailer family housing, MI 20208.

†**Mich., Dowagiac**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 50 unit family trailer housing, Mich. 20230.

†**Mich., South Lyon**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 40 unit family trailer housing, Mich. 20209.

Mo., Jefferson City—State, F. C. Donnell, gov., State Capitol, addnl. state office bldg.

★†**Montana**—U. S. Eng., 800 3 Ave., Seattle 4, Wash., bldgs., Missoula Co. Approx. $2,000,000.

★†**Montana**—U. S. Eng., 800 3 Ave., Seattle 4, Wash., bldgs., Richland Co. Approx. $2,000,000.

†**Nevada**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., plans by H. R. Lake, Claremont Hotel, Berkeley, Calif., family dwellings, Nev. 26153, and dormitory housing, Nev. 26154. CD 7/22.

†**Nevada**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, Calif., plans by C. F. Gromme, Alberts Bldg., San Rafael, Calif., family dwellings, Nev. 26152. CD 7/6—ENR 7/8.

†**New Jersey**—U. S. Eng., 120 Wall St., New York 5, N. Y., bldgs., Essex Co.

†**New Mexico**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Fort Worth, Tex., revised plans by Kruger & Associates, Box 308, Sena Plaza, Santa Fe, dwellings, N. M. 29166. Bids 7/12 rejected. CD 7/16—ENR 7/22 under LB.

†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, plans by Triangle Associates, 4614 Prospect Ave., Cleveland, trailer housing, Ohio 33270. CD 7/1—ENR 7/8.

†**O., Cleveland**—Pub. Housing Auth., NHA, 2073 E. 9 St., 400 unit family housing, Ohio 33274.

†**O., Cleveland**—Pub. Housing Auth., NHA, 2073 E. 9 St., 500 unit family housing, Ohio 33273.

Pa., Pittsburgh—St. Francis Hospital, W. J. Brandt, pres., Bd., 408-12 45 St., sketches made by Press C. Dowler, 802 Century Bldg., 4 story, bsmnt., 41x74 ft., brick, tile hospital bldg. addn. Applied for FWA funds.

†**Pa., Pottstown**—Pub. Housing Auth., NHA, 270 Bway, New York 7, N. Y., 160 unit family housing, Pa. 36437.

†**Texas**—Pub. Housing Auth., 1209 Electric Bldg., Seventh and Taylor Sts., Fort Worth, housing units.

†**Texas**—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., plant imprvs., Harris Co., bldgs. only, to Hubbard Constr. Co., 1507 Delano St., Houston, **$129,438.** Sheffield Steel Co. of Texas, Clinton Rd., Houston, will operate. CD 6/3—ENR 6/10.

†**Tex., Borger**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, 60 family dwelling units, Tex. 41599; 36 dormitory units, Tex. 41600.

†**Tex., Brownsville**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, 100 family dwelling units, Tex. 41598.

†**Tex., Dallas**—Home Owners' Loan Corp., Cotton Exchange Bldg., 500 family unit conversion program. CD 5/27—ENR 6/3.

†**Tex., Fort Worth**—White Settlement School Dist. 37, c/o W. W. Jones, Fort Worth, plans by A. B. Withers, Insurance Bldg., school bldg., facilities, utilities, etc., Tex. 41-586. **FWA.** CD 3/2—ENR 3/4.

†**Utah, Salt Lake City**—Home Owners' Loan Corp., Pacific Bldg., San Francisco, Calif., 200 family unit conversion program.

†**Washington**—Vancouver Housing Auth., Kirch Bldg., Vancouver, rejected bid, 3 child service centers, 1 ice house for housing, Wash. 45175, 1 child service center bldg. housing, Wash. 45173, for NHA. Will readvertise.

★**Wash., Seattle**—Port of Seattle, Bell St. Terminal, Zone 1, two 110x980 ft. transit sheds, $700,000. Col. W. C. Bickford, Bell St. Terminal, Zone 1, engr.

Alta., Edmonton—Dom. Government, Ottawa, Ont., plans by Dpt. Natl. Defense (Air), Lisgar Bldg., Ottawa, Ont., link trainer and repair shop. $50,000. Engineer, c/o W. C. G. Beveridge, O C, Edmonton, engr.

Alta., Edmonton—University of Alberta, associated with Provincial Dpt. of Health, Edmonton, blood plasma plant.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

Alta., Edmonton—Wartime Housing Ltd., 15 York St., Toronto, Ont., 100 addnl. houses. $130,000.

★**B. C., New Westminister**—Municipality, opening up entire north east section of city between 8 and 10 Aves., and First and Burnaby St., constr. 600 dwelling units $3,000-$3,500 ea.

B. C., New Westminister—N. W. School Bd., New Westminister, extensive addn. to Lord Tweedsmuir School.

Ont., Levack—International Nickel Co. of Canada Ltd., Copper Cliff, 60 dwelling units, $240,000.

Ont., Ottawa—Civil Service Recreation Assn., 54 Rideau St., Ottawa, recreation bldg., Wellington St., $400,000. M. Kenny, c/o Dpt. Transport Ottawa, pres.

Ont., Ottawa—Secy. Dpt. P. Wks., Ottawa, plans prepared by C. D. Sutherland, 94 Carling Ave., addnl. bldg. at Central Post Office, Besserer St., $200,000-$250,000.

Ont., Sudbury—International Nickel Co., of Canada Ltd., Sudbury, 100 houses at two sites, near here. $400,000.

BIDS ASKED

Bids Asked After July 29

†**N. Y., Rockville Centre**—Mercy Hospital, N. Village Ave., hospital addn. $290,700. **FWA.** J. Gunther, 193 Rockaway Ave., Valley Stream, archt. CD 3/2—ENR 3/4.

Bids Asked in August

†**Pa., Phila.**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., commercial, administration, maintenance bldgs. and garage, Pa. 36011-2. Plans deposit $25. Extended date. E. H. Wigham, 315 S. 16 St., archt. CD 4/16—ENR 6/24.

Bids Asked August 2

N. S., Shubenacadie—Deputy Minister Chas. Camsell, Dpt. Mines & Resources, Ottawa, Ont., Indian Agency bldg. groups, here and elsewhere. Plans deposit $25. Dpt. Mines & Resources, Ottawa, Ont., archts.

Bids Asked August 3

Mass., Canton—State, Dpt. P. Welfare, State House, Boston, power house work, boiler settings, steam piping, etc., Massachusetts Hospital School. Plans deposit $20. Francis W. Mahoney & Asso., 177 State St., Boston, engrs.

†**N. Y., Buffalo**—Federal Works Agency, 101 Park Ave., New York, demolition 7 frame bldgs. on site of proposed hospital addn., for Deaconess Hospital, 563 Riley St. CD 7/9—ENR 7/15.

†**O., Newton Falls**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, community bldg., Ohio 33044. Extended tentative date. L. E. Welker, 31 N. Summit St., Akron, archt. CD 7/2—ENR 7/8.

★†**South Carolina**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., brick, tile bldgs. $750,000. CD 7/14.

Ont., Ottawa—J. M. Somerville, secy. Dpt. P. Wks., central heating plant, Rochester St. Dpt. Mines & Resources, archts., and Dpt. P. Wks., engrs., both Ottawa.

Bids Asked August 4

†**Ky., Louisville**—Pub. Housing Auth., NHA, 9 St. and Prospect Ave., Cleveland, O., community bldg. for housing, Ky. 15021. Extended tentative date. E. G. Conrad, Hanna Bldg., Cleveland, O., archt. CD 5/20—ENR 6/27.

†**Louisiana**—New Orleans, Housing Auth., 226 Carondelet St., New Orleans, site work, incl. demolition, clearing, grading, etc. housing. La. 1-4, for NHA.

†**Wyoming**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., temporary dwelling units, Wyo. 48082. Five Associates, Belvidere Hotel, Salt Lake City, Utah, engrs.-archts. CD 7/20—ENR 7/22.

Bids Asked About August 5

†**Texas**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, dormitory units, Tex. 41-588. CD 7/6—ENR 7/15.

†**Texas**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, 5 family dwelling units, Tex. 41-589. CD 7/6—ENR 7/15.

Bids Asked August 5

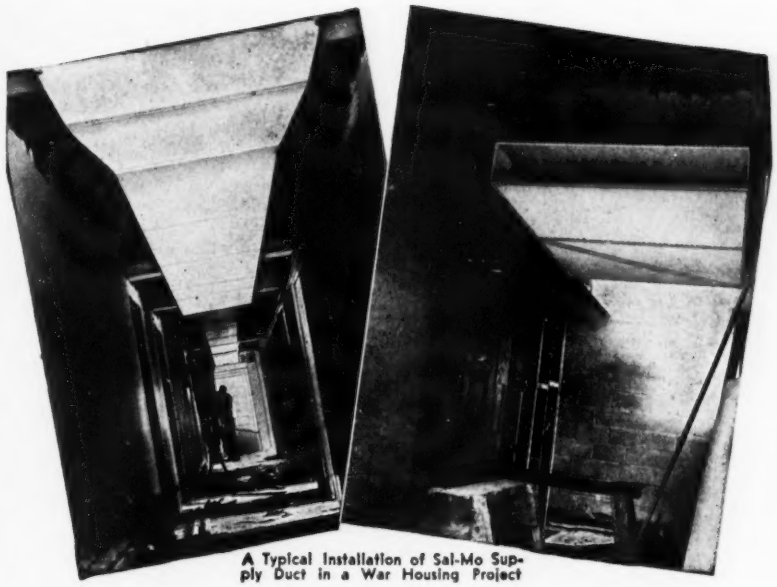
†**Idaho, Patterson**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, 1, Wash., 40 unit family dwellings, Idaho, 10105. Tentative date. F. H. Paraskice. Pocatello, archt. CD 6/22—ENR 7/8.

Bids Asked August 6

†**Calif., Blythe**—Pub. Housing Auth., NHA, 785 Market St., San Francisco, 40 dormitory units, Calif. 4729, 70 family dwelling units, Calif. 4730. Tentative date. G. Stanley Wilson, 3681 Sixteenth St., Riverside, archt. CD 7/13—ENR 7/15.

†**O., Dayton**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, community bldg., Ohio-33051. Extended tentative date. E. G. Conrad, Hanna Bldg., Cleveland, archt. CD 7/2—ENR 7/8.

†**Va., Williamsburg**—Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N. W., Wash., D. C., 768 unit dormitory housing, Va-44278. Tentative date. Carneal, Johnston & Wright, 1000 Atlantic Life Bldg., Richmond, archts. CD 7/8—ENR 7/15.



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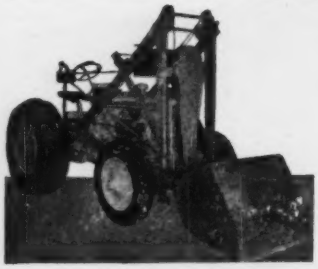

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PUBLIC BUILDINGS (Bids Asked, Cont'd.)

Bids Asked About August 9

†Texas—Pub. Housing Auth., NHA, 1205 Electric Bldg., Seventh and Taylor Sts., Fort Worth, dormitory units, facilities, Tex. 41-585. CD 7/1—ENR 7/8.

Bids Asked August 9

†Ohio—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, temporary family dwelling units, Ohio 33265. Plans deposit $50. Extended date. Britsch & Munger, Nichols Bldg., Toledo, archts. CD 7/16—ENR 7/22.

Bids Asked About August 10

†Ind., Columbus—Federal Works Agency, 20 N. Wacker Dr., Chicago, Ill., 2 story, brick, hospital addn., nurses' home, for Bd. Comrs. Bartholomew Co. and Bd. Hospital Trustees, Miss Olive Murphy, R.N., supt., Columbus. $237,000. Bohlen-McGuire & Shook and Normal-Hill, 1001 Farm Bureau Bldg., Indianapolis, assoc. archts. CD 3/1—ENR 3/4.

Bids Asked After August 10

†Pa., Aliquippa—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., community hall, PA-36051. Plans deposit $25. Extended date. Housing Architects of Beaver Co., 199 9 St., Monaca, archts. CD 6/30—ENR 7/8.

Bids Asked August 12

†Ohio—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, permanent dwelling units, Ohio 33261 and 33262. Extended date. Garfield, Harris & Robinson & Schaefer, National City Bank Bldg., Cleveland, archts. CD 7/21 and 6/16—ENR 6/24.

†Wis., Sturgeon Bay—Egeland Memorial Hospital Sturgeon Bay, 1 story, T-shaped, 135x148 ft. hospital addn., Docket Wis. 47-1371. $85,000. **FWA**, G. J. Feldhausen & G. E. Coughlen, Columbus Bldg., Green Bay, archts. H. W. Olmstead, Pub. Bldgs. Admin., Chicago, Ill., project engr. CD 2/3—ENR 2/11.

Bids Asked After August 12

†N. J., East Paterson—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., community bldg., NJ-28051. Plans deposit $10. Extended date. L. V. Pohlman, 1140 E. Jersey St., Elizabeth, archt. CD 7/8—ENR 7/15.

Bids Asked After August 14

†Pa., New Kensington—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., road, also tenant activity bldg., child care center, for PA-36111, for Westmoreland Co. Housing Auth., Aluminum City Terrace, New Kensington. Plans deposit $50. Extended date. CD 7/15—ENR 7/22.

Bids Asked August 15

†O., Cincinnati—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, community bldg. Ohio-33021. Extended tentative date. E. G. Conrad, Hanna Bldg., Cleveland, archt. CD 6/23—ENR 7/1.

†W. Va., St. Albans—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., community bldg., W. VA.-46011. Extended tentative date. E. G. Conrad, Hanna Bldg., Cleveland, O., archt. CD 6/23—ENR 7/1.

Bids Asked August 16

†Michigan—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., temporary family dwelling units, Mich. 20188. Plans deposit $50. Extended date. Smith, Hinchmann & Grylls, Marquette Bldg., Detroit, archts. CD 7/21—ENR 7/1.

†Mich., Detroit—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 300 unit family dwellings, Mich-20191. Tentative date. C. W. Ditchy, 705 Lincoln Bldg., and P. R. Sewell, 2631 Woodward Ave., archts. CD 6/23—ENR 7/1.

Bids Asked August 20

†Ohio—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, temporary family dwelling units, Ohio 33263. Plans deposit $50. Extended date. Potter, Tyler & Martin, 35 E. 7 St., Cincinnati, archts. CD 7/14—ENR 7/22.

Bids Asked August 24

†Utah—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo. dwelling units, Utah 42147. Five Associates, Belvidere Hotel, Salt Lake City, engrs.-archts. CD 6/23—ENR 7/8.

†Utah—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., dormitory units, Utah 42158. Five Associates, Belvidere Hotel, engrs.-archts. CD 6/23—ENR 7/8.

Bids Asked August 26

★**Ind., Evansville**—Evansville State Hospital, Bd. Trustees, J. H. Hare, M.D., supt., rebuilding Insane Hospital, incl. administration, main patients, power plant bldgs., brick, stone trim, rein.-con., structural steel construction. $2,500,000. Tentative date. McGuire & Shook, 1401 Fletcher Trust Bldg., Indianapolis, Zone 4, archts. Jno. M. Rotz Engr. Co., 804 Merchants Bank Bldg., Indianapolis, Zone 4, mech. engrs. CD 7/6—ENR 7/8.

Bids Asked About August 26

†Oregon—Pub. Housing Auth., NHA, Skinner Bldg., Seattle, 1, Wash., family housing conversion, Ore. 34264, 35269 and 35270. $400,000. CD 7/20—ENR 7/22.

Bids Asked August 27

†Nebraska—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., family housing, Neb. [illegible] Kimball, Steele & Sandham, 625 Electric Bldg., Omaha, engrs.-archts. CD 7/20—ENR 7/22.

†Nebraska—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., dormitory housing, Neb. [illegible] Kimball, Steele & Sandham, 625 Electric Bldg., Omaha, engrs.-archts. CD 7/20—ENR 7/22.

Bids Asked September 24

†Ia., Knoxville—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., D. C. N.P. Infirmary Bldg. 101, 1 Acute Bldg. 102, Connecting Corridor 101-102. CD 2/25—ENR 3/4.

Bids Asked

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, (selected list bidders), altering bldg., No. 19-023-44-Neg 7, Suffolk Co.

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, (selected list bidders), bldg., interior alterations, No. 19-023-44-Neg 10, Suffolk Co. Under $50,000.

†N. M., Roswell—Pub. Housing Auth., NHA, 1205 Electric Bldg., Fort Worth, Tex., 60 unit family dwellings, NM-29167. Tentative date not set. W. C. Kruger & Associates, Box 308, Sena Plaza, Santa Fe, archts. CD 6/23—ENR 7/1.

†N. Y., Sidney—Pub. Housing Auth., NHA, 270 Bway., New York, Zone 7, 160 unit family dwellings, NY-30170. Tentative bid date not set. P. Schulz, 506 W. 143 St., New York, and S. L. Gerwig, 211 W. Pine St., Rome, archts. CD 6/23—ENR 7/1.

★**†Tex., Baytown**—Defense Plant Corp., 811 Vermont Ave. N. W., Wash., D. C. synthetic rubbert plant expansion, $1,250,000. Goodyear Rubber Co., 1144 E. Market St., Akron, O. and General Tire & Rubber Co., 1708 E. Market St., Akron, O., will operate. W. D. LaRue, c/o Goodyear Tire & Rubber Co., Baytown, engr. CD 7/13—ENR 7/15.

LOW BIDDERS

†Mississippi—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., July 16, dormitory housing and fabricated dwelling units, appurtenant facilities, incl. community bldg., paint shop and cafe bldg., Miss. 22161 and 22162, from W. L. Perry Constr. Co., Philadelphia, **$159,000.** (**Correction**—low bidder). CD 7/20—ENR 7/22, under LB.

★**†Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, July 22, prefabricated temporary family dwellings, Ohio 33264, from John A. Johnson & Sons, 268 41 St., Brooklyn, N. Y., **$596,980.** CD 7/2—ENR 7/8.

†Texas—U. S. Eng., 25 St. and Avenue P, Galveston, July 17, bldgs., etc., Sol. 359-45-C176. Matagorda Co., from N. R. Smith, Bryan.

★**†Utah**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., July 19, housing, Utah 42153, 42155 and 42156, from Robt. E. McKee, 4700 San Fernando Rd. W., Los Angeles, Calif., **$957,000.** CD 6/23—ENR 7/1.

CONTRACTS AWARDED

†Ala., Chickasaw—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N. W., Wash., D. C., housing, NOY 6263, to Roberts & Long, Chickasaw, **$160,578.**

★**†Arkansas**—Defense Plant Corp., 811 Vermont Ave., Wash., D. C., zinc recovery plant, to Murch-Jarvis Co. Inc., 705 Olive St., St. Louis, Mo., **$550,000.** Athletic Mining & Smelting Co. R. F. Orr, pres., Fort Smith, will operate.

†California—H. J. Kaiser Co., Latham Sq. Bldg., Oakland, cafeteria bldg. addn., to Heyman Bros., 564 Market St., San Francisco. Federally financed.

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, addnl. bldg. facilities No. 101, Santa Barbara Co., to Geo. H. Whyte Jr., 825 S. Date Ave., Alhambra, over **$100,000.** Awarded 7/19.

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, bldg., No. 1370, Los Angeles Co., to United Concrete Pipe Corp., Box 1, Sta. H, Los Angeles, over **$50,000.** Awarded 7/14.

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, bldg., No. 294 at Riverside Ave., to Ivan M. Wells Constr. Co., 201 S. Linden Dr., Beverly Hills, under **$100,000.** Bids 7/15.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., Spec. 1028, San Francisco Co., to A. M. Hardy, 736 Clementina St., San Francisco. Awarded 7/19. CD 7/19—ENR 7/22.

†Calif., Alameda—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, Naval Air Station, NOY 6621, to Cahill Bros., 206 Sansome St., San Francisco, **$496,776.**

†Calif., Fallbrook—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., magazine, roads, etc., Naval Ammunition Depot, NOY 6193, to Haddock Engineers, Ltd., 225 Bush St., San Francisco, **$214,000.**

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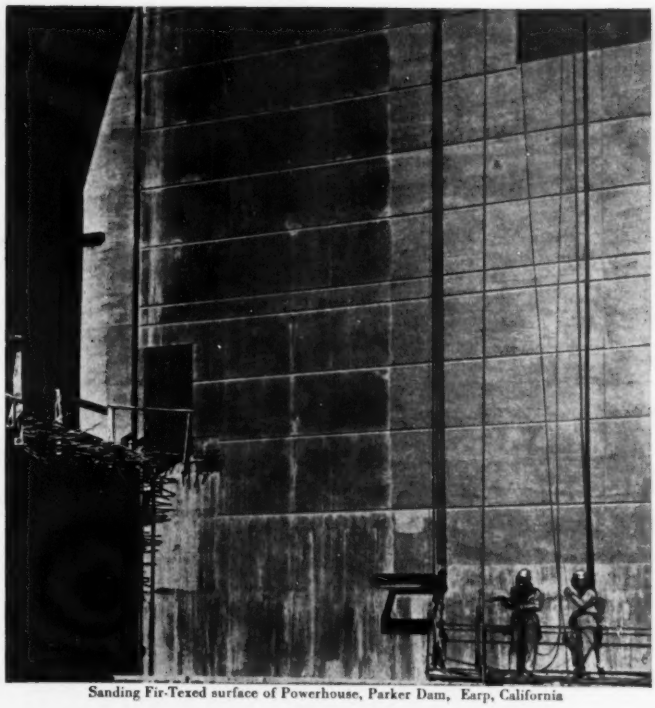

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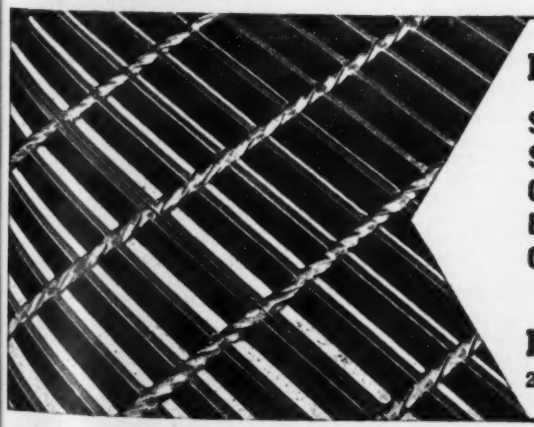

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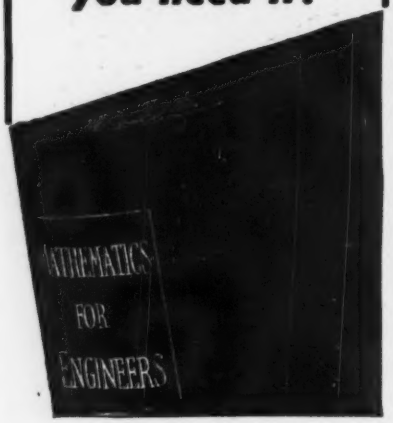

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**Calif., Hunters Point**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., storehouse bldgs., NOY 6269, to Nielsen, Erbentraut & Summers, 446-6 St., San Francisco, **$189,500.**

†**Calif., San Diego**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., boilers for heating plant, NOY 6829, to E. Keeler Co., Williamsport, Pa., **$151,940.**

†**Connecticut**—Pratt & Whitney Aircraft Div., United Aircraft Corp., 400 Main St., East Hartford, brick factory addn., Plant F, to Turner Constr. Co., 38 Newbury St., Boston, Mass., Est. over **$40,000.** Federally financed.

†**Conn., New London**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., housing, NOY 6567, to F. H. McGraw Co., 780 Windsor St., Hartford, **$232,800.**

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville, Zone 2, bldg., Neg-P.Y.-43-6, Orange Co., to James L. Barnes Constr. Co., 131 N. Ludlow St., Dayton, O., under **$50,000.** Awarded 7/19.

Fla., Jacksonville—City, furnishing two 225,000 lb. per hr. steam boiler with equip. and accessories for main municipal power plant, Tallerand Ave., to The Combustion Engineering Co., 200 Madison Ave., New York, N. Y., **$159,637;** constructing fdns. and installing above steam boiler, to Rust Engineering Co., Clark Bldg., Pittsburgh, Pa., **$50,000.** Awarded 7/16. Burns & Roe, 233 Bway., New York, N. Y., engrs.

†**Fla., Miami**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., bridge for machine shop bldg., Naval Air Station, NOY 6434, to Arkin-Pufert Co., 1719 Congress Bldg., **$26,061.**

†**Fla., Pensacola**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities, at Naval Hospital, NOY 6099, to Kenneth Fulghum, 107 E. Baylin St., **$177,895.**

†**Idaho, Pocatello**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., 4 bridge cranes, at plant, NOY at Naval Ordnance Plant, 6880, to Judson-Pacific Co., 1200 17 St., San Francisco, Calif., **$76,000.**

★†**Idaho, Pocatello**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., production overhaul and proof shop, Naval Ordnance Plant, NOY 6463, to Winston Bros. Co., C. F. Haglin & Sons, Inc., Missouri Valley Bridge & Iron Co. & Sollitt Constr. Co., Inc., 1470 Northwestern Bank Bldg., Minneapolis, Minn., **$1,144,000.** CD 5/27.

†**La., New Orleans**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., 2 bachelor officer's quarters, Naval Station, NOY 6423, to Perrilliat Rickey Constr. Co., S. Rendon and Eve Sts., **$156,998.**

†**Massachusetts**—Bethlehem Steel Co., E. Howard St., Quincy, pipe welding and X-ray bldg. addns., extensive alterations, to R. R. Jacobucci, 28 Dayton St., Quincy. Est. **$40,000.** Federally financed.

†**Mass., South Boston**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., ships company instruction and organization bldg., Naval Dry Dock, NOY 6408, to J. F. Fitzgerald Constr. Co. Inc., 214 Essex St., Boston, **$100,652.**

★†**Michigan**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., temporary family dwellings, MI 20181, to Benj. Chemers Co., 111 W. Washington St., Chicago, Ill., **$598,000** frame construction. Bids 6/28. CD 7/19—ENR 7/22 under LB.

†**Michigan**—Brunswick-Balke-Collender Co., 1700 Messler St., Muskegon, brick, concrete airplane assembly bldg., to Strom & Strom, 1770 6 St., Muskegon. Est. **$375,000.** Defense Plant Corp. will finance. CD 7/7—ENR 7/15.

★†**Mississippi**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., housing, Miss. 22159, 22160, 22163 and 22164, to Algernon Blair, Inc., First National Bank Bldg., Montgomery, Ala., **$967,416.** CD 7/20—ENR 7/22.

†**Montana**—U. S. Eng., 800 3 Ave., Seattle, 4, Wash., bldgs., Fergus Co., to John Sletten & Co., Great Falls, under **$50,000.**

†**New Mexico**—U. S. Eng., Albuquerque, addnl bldgs., Curry Co., to Suggs Constr. Co., c/o U. S. Army Training Station, Big Spring, Tex., and General Del., Abilene, Tex., under **$50,000.**

†**New Jersey**—Pub. Housing Auth., NHA, 270 Bway., New York, 7, N. Y., community bldg. and child care service bldg., NJ 28071, to Agostini Bros. Bldg Co., 55 W. 42 St., New York, N. Y., **$156,450.** CD 7/15—ENR 7/22 under LB.

★†**New Jersey**—Pub. Housing Auth., NHA, 270 Bway., New York 7, N. Y., housing, N.J. 28160 and 28161, to John A. Johnson & Sons, 266 41 St., Brooklyn, N. Y., **$759,000.** Bids 7/12. CD 7/15—ENR 7/22, under LB.

†**New Jersey**—U. S. Eng., 120 Wall St., New York 5, N. Y., constructing, painting temporary frame bldgs., Essex Co., to Hugh Montague & Sons, 550 Bergen Ave., Jersey City Est. **$75,000.**

†**New Mexico**—U. S. Eng., Albuquerque, bldg. expansion, Santa Fe Co., to W. T. Davis Constr. Co., Albuquerque, under **$500,000.** Bids about 7/21, awarded 7/21. CD 7/13.

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

★†Ohio—Dayton Metropolitan Housing Auth., Dayton, housing, Ohio 33155, for NHA, to Frank Messer & Sons, Inc., 2515 Burnet Ave., Cincinnati, **$702,950.** Bids 7/12. CD 6/30—ENR 7/8.

★†Ohio—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, housing, Ohio 33269, to Madsen Const. Co., 1790 Lyndale Ave. S., Minneapolis, Minn., **$564,200.** Bids 7/8. CD 7/14—ENR 7/22, under LB.

†O., Akron—Akron City Hospital, T. B. Tomkinson, pres., 525 Market St., 3 story, bsmt., 46x135 ft., brick, rein.-con. hospital addn., to Carmichael Constr. Co., 148 E. Miller Ave., **$183,992.** Good & Wagner, First Central Tower Bldg., archt. A. E. Rowe, 1900 Euclid Ave., Cleveland, engr.

†O., Akron—St. Thomas Hospital, Sister Eleanor, supt., 444 N. Main St., brick, rein.-con. hospital addn., to Mastran Constr. Co., 1613 Ohio Ave., Youngstown. Est. **$200,000.** Kraus & Helcamp, First Central Tower Bldg., archt. A. S. Rowe, 1900 Euclid Ave., Cleveland, engr. CD 6/22—ENR 6/24.

†Oklahoma—U. S. Eng., 416 Wright Bldg., Tulsa, Zone 2, bldgs., facilities, Sol. 957-Neg-43-344, Pittsburg and Woods Counties, to E. A. Lewellen, Colcord Bldg., Oklahoma City, **$100,000-$500,000.**

†Pennsylvania—Allegheny County Housing Auth., 201 County Office Bldg., Pittsburgh, 8 and 10 vitr. clay and c.i. sanitary sewerage sys., to serve housing, Pa. 36305 and 36302, for NHA, to Mike Manella Co., 500 Jones Law Bldg., Pittsburgh, **$42,297.** CD 7/7.

†South Carolina—U. S. Eng., 38 Customhouse, Charleston, bldgs., Charleston Co., to C. Y. Thomason Co., Greenwood, under **$50,000.** Bids 7/19.

†Tenn., Millington—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. facilities at N.A.T.C., NOY 6284, to Dunn Constr. Co., Polk Smartt Paving Co., 635 E. 9 St., Chattanooga, **$39,739.**

†Texas—U. S. Eng., Fort Sam Houston, bldgs., addnl. facilities, Taylor Co., to Rose & Oates, Abilene, **$50,000-$100,000.** CD 7/20—ENR 7/22.

†Texas—U. S. Eng., Fort Sam Houston, bldg., Webb Co., to G. Falbo, 107 Morales St., San Antonio, under **$50,000.**

★†Texas—U. S. Eng., 221 W. Main St., Denison, housing, Moore Co., bldgs., to Eckert Fair Constr. Co., Liberty Bank Bldg., Dallas, over **$500,000;** utilities, to Sherman Machine & Iron Wks., 18 E. Main St., Oklahoma City, Okla., under **$50,000.** CD 10/2—ENR 10/15.

★†Tex., Kingsville—Pub. Housing Auth., NHA, 1209 Electric Bldg., Seventh and Taylor Sts., Fort Worth, prefabrication and erection 200 family dwelling units, Tex. 41570, to E. L. Bruce & Co., P. O. Box 397, Memphis, Tenn., **$587,832.** Brooks & Anderson and N. W. Hardy, 210 Jones Bldg., Corpus Christi, assoc. engrs. and archts. CD 5/18.

†Utah—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., community bldg. and administration bldg., Utah 42042, to J. I. Barnes, 1119 Montana Ave., Santa Monica, Calif., **$190,000.** CD 6/15—ENR 6/17.

†Va., Camp Bradford—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., storehouses, NOY 6432, to L. V. Abbott, T-678, Camp Lee, **$94,840.**

†Va., Hampton Roads—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., quarters for WAVES, Naval Aviation Center, NOY 6247, to Laburnum-Pettyjohn Assoc., Foushee and Franklin Sts., Richmond, **$247,600.**

†Va., Norfolk—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., completion electrical and mechanical work, NOY 6952, under Contr. NOY 5963, N O B Norfolk, to Mechanical Engineering Corp., 238 Bank Bldg., Norfolk, **$81,000.** Subject to further negotiation.

†Va., Norfolk—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., completion of projects under NOY 4349, Naval Operating Base, NOY 7029, to McLean Constr. Co., 1301 Fidelity Bldg., Baltimore, Md. Additional to CD 8/25/42—ENR 8/27/42, under CA.

†Va., Yorktown—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., mine testing bldg., Naval Mine Depot, NOY 6253, to Virginia Engineering Co., Inc., Newport News, total est. **$227,200.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, Zone 4, storage bldg., Spokane Co., to Hansen & Weidner, W 232 Pacific St., Spokane, **$50,000-$100,000.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, Zone 4, fire control station, Clallam Co., to Sound Constr. & Eng. Co., and Peter Kiewit Co., Northern Life Tower, Seattle, Zone 1, under **$50,000.**

†Wash., Seattle—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., personnel structures, Naval Base, NOY 6712, to J. W. Bailey Constr. Co., 228 9 Ave. N.W. **$360,438.** CD 7/6—ENR 7/15.

★†Wisconsin—A. O. Smith Corp., 3533 W. 27 St., Milwaukee, concrete and masonry work, 1 and 2 story, 340x440 ft. propeller factory, 1 story, 60x120 ft. garage, 50x120 ft. boiler house, to Hunzinger Const. Co., Sta. K, Milwaukee, **$721,634.** Defense Plant Corp. will finance. Awarded 7/22. CD 7/12—ENR 7/15.

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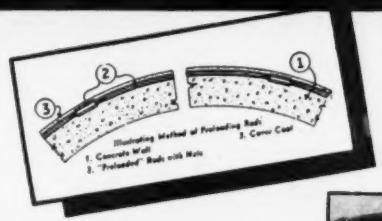

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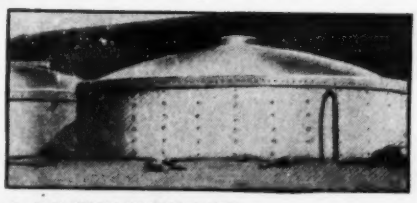

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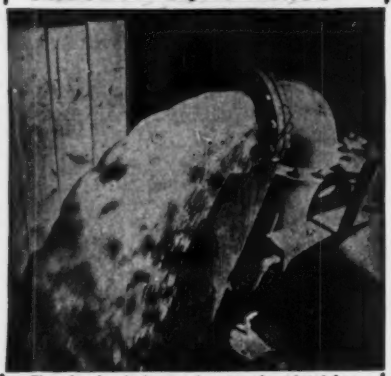

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**Wisconsin**—Nash-Kelvinator Co., 5625 25 Ave., Kenosha, brick, concrete test cells bldgs., to Consolidated Constr. Co., Kenosha. Est. approx. $150,000. Federally financed. Giffels & Vallet, 1000 Marquette Bldg., Detroit, Mich., engrs.

B. C., Esquimalt—Dpt. National Defense (Sea) Ottawa, Ont., workshop at H. M. C. Dockyard, to Nortnern Const. Co. Ltd., 736 Grenville St., Vancouver, $47,000.

Man., Riding Mountain—Wartime Housing, Ltd., 55 York St., Toronto, Ont., 13 frame bldgs., to Carter-Halls-Aldinger Co. Ltd., Royal Bank Bldg., Winnipeg, about $200,000.

N. B., Saint John—Wartime Housing Ltd., 55 York St., Toronto, Ont., 50 houses, 2 staff houses and commissary bldg., to Hill-Clark-Francis, Ltd., Whitewood Ave., New Liskeard, Ont., about $215,000-$250,000. CD 7/9.

N. S., Liverpool—Wartime Housing Ltd. 55 York St., Toronto, Ont., 75 houses, to Hill-Clark-Francis, Ltd., Whitewood Ave., New Liskeard, Ont., about $250,000-$300,000.

Quebec—Dpt. National Defense (Army), Ottawa, Ont., experimental plant Quebec Province, to Maglioe Couchon Ltd., 311 De La Salle St., Quebec City, about $400,000.

★**Que., Arvida**—Wartime Housing Ltd., 55 York St., Toronto, Ont., 300 addnl. houses, to Hill-Clark-Francis, Ltd., Whitewood Ave., New Liskeard, Ont., about $1,000,000-$1,250,000. CD 7/9.

COMMERCIAL BUILDINGS

PROPOSED WORK

Calif., Long Beach—Biltmore Homes, Inc., c/o C. N. Aldrich, archt., 1634 Dawson Ave., 50 frame, stucco dwellings, near Harding and Cherry Aves. Over $150,000.

★**Calif., Oakland**—P. F. Heraty, Inc., 3625 MacArthur Blvd., Oakland, 299 one story frame residences. $5,000 ea.

Conn., Stamford—Owner, c/o Michael Wopsey, atty., 25 Bank St., frame housing development, 10 acre site, Dora St. Over $150,000.

★**Md., Turners Station**—Joseph P. Day, Inc., 405 Lexington Ave., New York, N. Y., completing plans by Gustave W. Iser, 109 W. 29 St., New York, N Y., 500 family units on 37 acre site, $2,500,000. FHA. CD 5/13—ENR 6/20.

O., Cleveland—Shaker Colony Co., A. A. Treuhoft, pres., Fairmount Blvd., plans by Maxwell A. Norcross, 7016 Euclid Ave., four 2 story, brick apartment bldgs. $400,000.

O., Cleveland—Shaker Garden Co., c/o Chas. Keyses, 2460 Fairmount Blvd., plans by Maxwell A. Norcross, 7016 Euclid Ave., five 2 story bamnt., brick apartment bldgs. $400,000.

O., Cleveland—Bellaire-Puritas Bldg. Co., J. Newman, 3785 Claridge Oval, sixty 1 story, bsmt., 25x29 ft., brick homes, $360,000.

O., Cleveland—A. Pucciani, 2671 Cranlyn Rd., fifty-six 1½ story, bsmt., 25x27 ft. homes, $336,000.

★**Tex., Goose Creek**—Tejas Development Co., 150 frame type dwellings, Morrell Park Addn. 2. $500,000.

CONTRACTS AWARDED

★**Ariz., Litchfield Park**—Goodyear Aircraft Corp., 1144 E. Market St., Akron, O., Westwood Manor Project, 69 frame stucco, duplex and 4-family apartment type homes, Litchfield Rd., near here, to P. W. Womack Constr. Co., 1712 S. Central Ave., Phoenix. Est. $1,000,000. FHA. Lescher & Mahoney, 1100 Title & Trust Bldg., Phoenix, site engrs. and archts. CD 11/21/41—ENR 11/27/41.

Calif., Lakewood Village—Alamitos Circle Co., 8473 Beverly Blvd., Los Angeles, 64 frame, stucco dwellings, to C. L. Peck, 354 S. Spring St., Los Angeles, approx. $275,000. H. J. Homer, 8473 Beverly Blvd., Los Angeles, archt.

Calif., Newhall—Bermite Powder Co., Mint Canyon Rd., Saugus, 50 frame, stucco dwellings. Owner builds. $150,000. Geo. D. Fosdyke, 112 N. Main St., Los Angeles, engr.

Md., Baltimore—Marlyn Gardens, Inc., Jas. Dorment, pres., 180 Union St., Montclair, N. J., one hundred thirty 2 story, bsmnt., 26x42 ft., brick family dwellings, Marlyn Ave, near Old Eastern Ave Owner builds. $390,000. Cyrill H. Hebrank, 20 E. Lexington St., archt.

★**Mass., Cambridge**—Massachusetts Institute Technology, 77 Massachusetts Ave., 3 story, 215x345 ft. bldg., Vassar St., to McCreery & Theriault, 131 Clarendon St., Boston. Est. $500,000.

Ia., Burlington — Chicago, Burlington & Quincy R.R. Co., H. R. Clark, ch. engr., 547 W. Jackson Blvd., Chicago, Ill., rebuilding passenger station, to Lovering Constr. Co., 893 E. 8 St., St. Paul, Minn. Est. $300,000. Holabird & Root, 333 N. Michigan Ave., Chicago, Ill., archts. CD 1/27—ENR 2/4.

★**Pa., Leetsdale**—P. Gentile, c/o S. R. L. Rosseau, archt., 248 Highland Ave., Pittsburgh, 65 (ultimately 90) 2 story bsmnt., 25x35 ft., brick, tile family dwellings, to Stevens Building Co., 2270 Wm. Penn Hy., Wilkinsburg Est. $656,000.

Tex., Brownsville—Geo. A. Jackson & Co., Greenville Ave., Dallas, 106 dwellings, utilities, facilities, etc., force-account, $375,000. CD 7/20—ENR 7/22.

Tex., Galveston—First Mortgage Co. of Houston, Inc., Esperson Bldg., Houston, 40 frame type dwellings, etc., to E. W. Newmann, 5112 0½ St., approx. $178,000.

Tex., Goose Creek—A. H. Boulim, Jr. and Associates, Goose Creek, one hundred 5 and 6 room frame dwellings, Weickesheimer Courts, force account. Approx. $425,000. CD 7/21.

Tex., Goose Creek—Empire Building Co. and Associates, Goose Creek, 72 housing units. Owner builds. Approx $310,000. CD 7/21.

Tex., Goose Creek—Harper Development Co., Goose Creek, 50 frame dwellings, Danubina Courts, force account, approx. $200,000. CD 7/22.

★**Tex., Houston**—Farm & Home Savings & Loan Assn., Shell Bldg., 88 (ultimately 190) frame dwellings, Galena Park Area, force-account, $325,000. Total est. $600,000. FHA. CD 7/20—ENR 7/22.

Tex., Houston — White Constr. Co., 1930½ Bissonet St., 20 or more dwellings, facilities, utilities, etc., force-account, $150,000.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Delano—FOOD PLANT—A. Perilli-Minetti & Sons Co., Delano, food plant, $50,000.

Mass., Malden (br. Boston)—PLANT—Converse Rubber Co., 392 Pearl St., soon lets contract 1 story, 80x85 ft., rein.-con. plant addn. A. Rosenstein, 120 Milk St., Boston, archt.

N. J., Rahway—PLANT—The Merck Co., 126 E. Lincoln Ave., plans by The Ballinger Co., 105 E. 12 St., Phila., Pa., general alteration mfg. plant.

Tenn., Chattanooga — FACTORY—Combustion Eng. Co., Inc., c/o President, 1032 W. Main St., brick, concrete, steel factory addn. $100,000.

Wis., Oshkosh—FACTORY—Oshkosh—Wood Products Corp., 220 Marion St., rebuilding factory. Loss $150,000.

N. J., Garfield—FACTORY—Heyden Chemical Co., 50 Union Sq., New York, N. Y., or 290 River Rd., preparing plans 3 story, brick factory.

BIDS ASKED

Mass., Lynn—PLANT—General Electric Co., 920 Western Ave., (selected bidders) 1 story, 60x80 ft., brick, concrete research and testing facilities plant.

R. I., Cranston (Br. Providence)—PLANT—The Fields Corp., L. S. Betlam, 71 Willard Ave., Providence, 1 story, bsmnt., 75x80 ft. plant, Fields St. Barker & Turoff, 1022 Grosvenor Bldg., Providence, archts.

CONTRACTS AWARDED

Calif., Alhambra—PLANT—C. F. Brawn & Co., 1000 S. Fremont Ave., 50x200 ft., 20x30 ft., 31x191 ft. and 26x56 ft., frame and reinforced brick plant bldgs. Owner builds, $51,500.

Calif., Los Angeles — FACTORY — Century Metalcraft Co., 659 E. 60 St., 188x200 ft., brick factory bldg., to Ted R. Cooper Co., 1031 So. Bway., approx. $70,000.

Ia., Middle Amana — REFRIGERATION PLANT—Amana Refrigerating Plant, rebuilding refrigeration mfg. plant, destroyed by fire, to Paulson Constr. Co., Cedar Rapids, $65,000. CD 6/14—ENR 6/17.

Mass., Springfield—LABORATORY—Shawinigan Resins Corps., 644 Main St., Indian Orchard, 1 story, 62x85 ft., brick, concrete laboratory, to Adams & Ruxton Constr. Co. 1387 Main St.

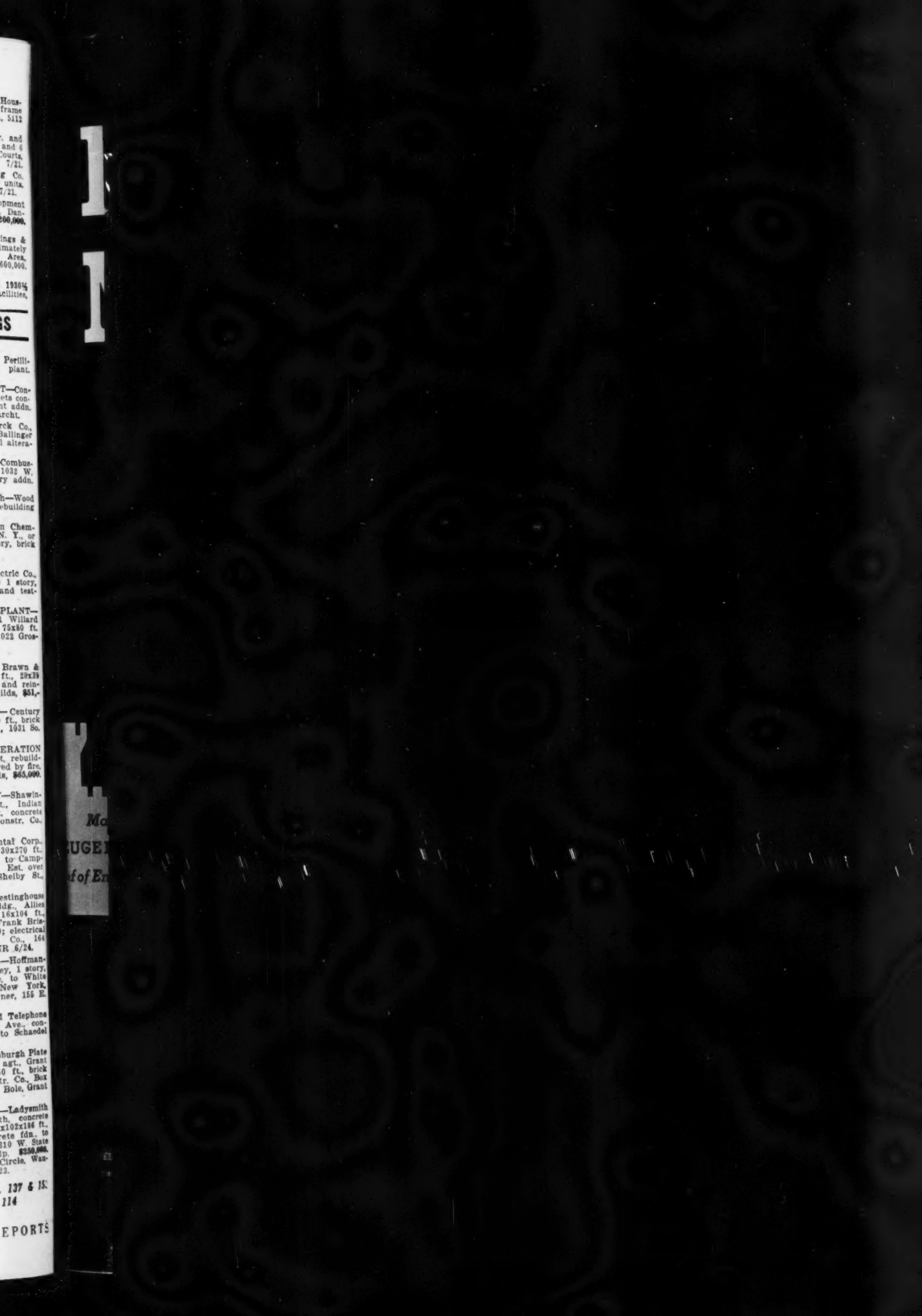
Mich., Detroit—PLANT—Continental Corp., 2901 E. Jefferson Ave., 1 story, 130x270 ft., brick, concrete, steel service bldg., to Campbell Constr. Co., 3255 Coldner Ave. Est. over $40,000. Russell Eng. Co., 607 Shelby St., engrs. CD 6/22—ENR 6/24.

N. J., Bloomfield—FACTORY—Westinghouse Electric & Mfg. Co., Maloney Bldg., Allies Blvd., Pittsburgh, Pa., 2 story, 16x104 ft., brick, concrete factory addn., to Frank Briscoe, 2875 S. 19 St., Newark $50,000; electrical work, to W. L. Schoonover & Co., 164 Emmet St., Newark. CD 6/22—ENR 6/24.

N. J., Clifton—BOILER HOUSE—Hoffman-LaRoche Co., Kingsland Rd., Nutley, 1 story, brick, concrete block boiler house, to White Constr. Co., 95 Madison Ave., New York, N. Y., $40,000. Fellheimer & Wagner, 155 E. 42 St., New York, N. Y., archts.

N. J., Newark—PLANT—Federal Telephone & Radio Corp., 200 Mt. Pleasant Ave., conversion bldg. for mfg. purposes, to Schaedel Bros., 130 Bruce St.

Pa., Creighton — PLANT — Pittsburgh Plate Glass Co., M. E. Carlisle, purch. agt., Grant Bldg., Pittsburgh, 1 story, 100x250 ft., brick assembly bldg., to Groomes Constr. Co., Box 133, Springdale. Est. $40,000. R. D. Bole, Grant Bldg., Pittsburgh, ch. engr.

Wis., Ladysmith—CREAMERY—Ladysmith Milk Producers Assn., Ladysmith, concrete and masonry contract 1 story, 56x102x186 ft., brick, tile creamery addn., concrete fdn., to Edw. Steigerwald & Sons, Inc., 5310 W. State St., Milwaukee. Est. incl. equip. $250,000. M. F. Pfaller, 8525 Ravenswood Circle, Wauwatosa, archt. CD 3/17—ENR 3/23.

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